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SYDNEY: SATURDAY, JULY 5, 1924.

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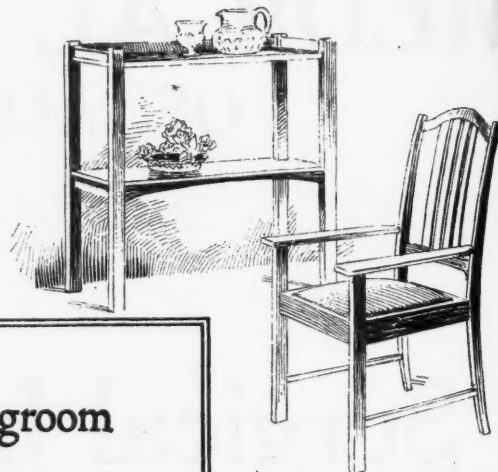
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NOTES ON THE DIFFERENTIAL WHITE BLOOD CELL PERCENTAGES OF RESIDENTS OF BRISBANE, QUEENSLAND.¹

By W. C. SWEET, M.D.,

*State Director, International Health Board;
Director, Australian Hookworm
Campaign, Queensland.*

THE Australian Hookworm Campaign in the course of a malaria and filaria survey obtained many thin smears of blood for examination for malarial parasites. Since these thin smears were suitable for differential blood counts, such counts were made on a proportion of all slides obtained. Most of these slides were collected after 8 p.m. and before midnight. They were made according to the following instructions:

Blood for specimens should be obtained from the finger. The pulp of the fourth finger is best. It is not desirable to use the lobe of the ear for this purpose as blood from that situation generally contains an excess of mononuclear cells. The patient is advised to open and shut the hand rapidly several times and to hang it down or swing it from the wrist. A piece of tape is then run

round the finger without tying or the blood is forced down into the tip by pressure with the thumb at the level of the second joint. The tip of the finger is then cleaned with alcohol and dried with a small piece of cotton wool. The pulp is punctured by a sharp needle, such as a Hagedorn, at right angles to the surface. Reject and wipe off the first drop of blood that exudes. Then receive on a slide the smallest drop obtainable without smearing. Apply another slide to the surface of the first at an angle of 45°, placing the slide's edge immediately in front of the drop. The blood will then run out by capillary attraction along the angle formed by the slides. If the upper slide is then pushed sharply along, it pulls out the drop to form a thin, tongue-shaped film. A successful preparation should thin out at the margins and at the end of the film and the blood cells will be arranged discreetly.

The slides were stained by the following method: (i.) Fix in methyl alcohol for five minutes; (ii.) stain with Delafield's hæmatoxylin for five minutes; (iii.) wash quickly in tap water; (iv.) stain with a few drops of eosin for about twenty seconds; (v.) wash in tap water until the stain is blue.

Examinations were made with the oil immersion objective of a microscope by specially trained members of the staff. Two hundred cells per slide were counted to establish the percentages given.

A classification of leucocytes recommended by J. D. Thompson was adopted for reporting results. This classification was given in the reviewer's note in the *Tropical Diseases Bulletin*, February, 1924, on page 112 and was as follows:

¹The investigations here reported were made by the Australian Hookworm Campaign, which was supported by the Commonwealth of Australia, the State of Queensland and the International Health Board of the Rockefeller Foundation.

TABLE I.
DIFFERENTIAL BLOOD COUNTS OF SEVEN GROUPS OF RESIDENTS OF BRISBANE.

Group Number.	Age of Group	Number of Persons.	Percentage of Neutrophile Cells.			Percentage of Lymphocytes.			Percentage of Endothelial Leucocytes.			Percentage of Eosinophile Cells.			Percentage of Basophile Cells.		
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
1	5-14	285	76.0	17.0	51.5	57.0	10.0	29.5	25.0	1.5	6.0	65.0	1.0	12.5	4.0	0.0	0.5
2	5-16	197	69.0	24.0	52.0	65.0	15.0	35.1	12.0	2.5	6.5	48.0	0.5	5.9	2.0	0.0	0.5
3	1-17	128	69.0	16.0	45.2	74.0	17.0	42.2	44.0	0.0	5.9	38.0	0.0	7.3	3.0	0.0	0.4
4	12-18	13	87.0	40.0	60.1	44.0	9.0	28.1	9.5	0.5	5.9	29.0	0.5	5.0	1.0	0.0	0.2
5	19-40	90	89.0	29.0	53.7	57.5	8.5	30.4	19.0	0.0	5.7	34.0	0.0	4.9	2.5	0.0	0.2
6	41-60	50	85.5	32.0	58.1	56.0	13.0	31.9	16.0	0.5	4.9	52.0	0.0	4.9	1.5	0.0	0.2
7	Over 60	30	80.0	37.0	60.4	53.0	13.5	29.7	12.0	1.0	5.6	11.5	0.0	4.0	3.5	0.0	0.3
—	All ages	698	—	—	52.0	—	—	33.0	—	—	6.0	—	—	8.6	—	—	0.3

Polymorpho-nuclear cells ... { neutrophile cells
eosinophile cells
basophile cells

Mononuclear cells ... { lymphocytes
endothelial leucocytes

The lymphocyte type of cell has its origin in the lymph tissues throughout the body, but more especially in the lymph nodes. It is not derived from the bone marrow.

The large mononuclear type is probably derived from endothelial cells lining blood and to a less extent lymph vessels by proliferation and desquamation. It is specially active as a phagocyte. The "so-called" transitional, considered to be a degenerating endothelial leucocyte, is included in this category and is not recognized as a separate class.

No counts showing any abnormal blood cells were included.

The persons upon whom blood counts were made, were divisible into seven groups as follows:

Groups I. and IA. were made up from the children of an orphanage near Brisbane. They were from five to fourteen years of age and many of them were at least half-caste aborigines. Faecal specimens were examined from all these children and all who showed ova in their faeces, were discarded. Children in Group I. were free of intestinal helminths and did not have filariasis; those in Group IA. had no intestinal worms, but did show micro-filariæ in their blood smears.

Group II. was made up of ninety-seven apparently healthy children attending a convent school. None of them had filariasis. Their ages ranged from six to sixteen years. They appeared to be from a better class of family than did the children of Groups I. and IA.

Groups III., IV., V., VI. and VII. were composed of patients in hospitals. They were from all

wards except the ones for contagious diseases. They were divided into groups according to age: from one to eleven years, twelve to eighteen, nineteen to forty, forty-one to sixty and over sixty. The members of these groups did not have filariasis while the members of the corresponding "A" groups did. None of the persons in any group had malaria.

Results of Blood Counts.

Table I. gives the percentages of leucocytes found in counts on the filaria-free groups; the group number, the age grouping, the number of persons in each group and the average percentage of blood cells of each type are given, as well as the maximum and minimum individual percentages for each type. Considerable variation in percentage would be expected in Groups III., IV., V., VI. and VII. who were patients admitted to hospital for various conditions, but the variations in the first two groups made up of apparently healthy children are not so easily explained. There would of course be a natural error in counting, but it would probably not account for anywhere near the variations here recorded. It is probable, of course, that children in each group had unrecognized abnormal conditions which might have been responsible, but it would also seem that the "normal percentages" established are subject to very considerable variation due to many factors as yet unrecognized.

The 698 persons of all ages listed in Table I. had an average of 52.0% polymorpho-nuclear neutrophile leucocytes, 33.0% lymphocytes, 6.0% endothelial leucocytes, 8.6% eosinophile cells and 0.3% basophile cells. Certain other differential blood counts available to the writer are of interest in this connexion. They are given in Table II.

TABLE II.
DIFFERENTIAL BLOOD COUNTS AS REPORTED BY VARIOUS OBSERVERS.

Observer.	Description of Groups.	Percentage of Neutrophile Cells.	Percentage of Lymphocytes.	Percentage of Endothelial Leucocytes.	Percentage of Eosinophile Cells.	Percentage of Basophile Cells.
Breidl and Priestley ⁽¹⁾	150 White children, North Queensland, 7 to 15 years old	56.1	29.5	6.6	7.7	0.04
Fairley ⁽²⁾	29 Melbourne adults	54.5	39.1	4.5	1.5	0.4
Ehrlich and Lazarus ⁽³⁾	Normal European	65 to 70	20 to 25	6 to 8	2 to 4	0.5
Scott and French ⁽⁴⁾	Normals	65 to 72	20 to 30	4 to 10	1 to 2	0.25 to 0.5

TABLE III.
BLOOD FORMULÆ OF VARIOUS OBSERVERS.⁽²⁾

Observer.	Date.	Polymorpho-nuclear Cells.	Mononuclear Cells.	Remarks.
Tate and McLeod	1919	49.5%	50.2%	Fasting
V. Bonsdorff	1914	48.0%	52.0%	Fasting
Türk	1912	58.1%	41.9%	—
Zappa	1920	61.0%	39.0%	—
Fairley	1922	56.4%	43.6%	At various times from 8.30 a.m. to 10 p.m.
Sweet	1923	60.9%	39.0%	After 8.0 p.m. at night school children and hospital patients

The average counts reported in this article vary but little from those reported by Breinl and Priestley for white children of North Queensland. They are also comparable to Fairley's average for Melbourne adults with the exception of the comparative eosinophilia of the Brisbane average. The principal differences between these counts and the two listed as normal are in a decreased percentage of neutrophile cells and increased percentages of lymphocytes and eosinophile cells. In connexion with the decreased percentage of neutrophile cells a table given by Fairley, reproduced here with an addition, is of interest.

The normal percentages of neutrophile cells as reported in Table II. are apparently too high and the percentages of lymphocytes correspondingly too low. The percentages of polymorpho-nuclear cells and mononuclear cells of the Brisbane counts are practically identical with those reported by Türk and Zappa and comparable to those of the other observers reported in Table III. This is in spite of the more or less artificially selected persons comprised in the Brisbane counts made up entirely of school children and hospital patients. It would seem that the average differential blood count of large numbers of hospital patients approximates the normal count, in spite of the wide individual variations.

Influence of Age on Differential Blood Counts.

Certain influences affecting the differential blood counts should be mentioned. Amongst these influences is that of increasing age which in the work here reported would seem to be responsible for an increase in the percentage of neutrophile cells at

TABLE IV.
DIFFERENTIAL BLOOD COUNTS BY AGE GROUPS.

Age.	Number of Persons.	Percentage of Neutrophile Cells.	Percentage of Lymphocytes.	Percentage of Eosinophile Leucocytes.	Percentage of Eosinophile Cells.	Percentage of Basophile Cells.
1 to 5..	49	40.7	44.4	7.4	7.0	0.5
6 to 8..	64	44.8	40.6	6.9	7.2	0.5
9 to 11..	56	48.6	37.3	6.4	7.6	0.5
12 and 13..	23	53.7	33.3	6.9	5.6	0.4
14 and 15..	29	54.1	35.2	5.7	4.7	0.3
16 to 18..	22	57.5	30.1	5.4	6.5	0.4
From 19 up	170	59.0	30.7	5.4	4.7	0.2
All ages..	413	52.4	35.2	6.2	5.8	0.3

the expense of the other leucocytes. Group I. in Table I. is not significant in this connexion as most of the variations from average in this group are accounted for by the largely increased percentage of eosinophile cells. That group, therefore, is not included in Table IV. which gives the differential blood counts, strictly according to age, of Groups II. to VII. inclusive.

Table IV. shows this tendency to increase of polymorpho-nuclear neutrophile percentage with increasing age; the percentage of the one to five years group was 40.7, while the adult group, from nineteen up, had 59.0% with a constant increase in the intermediate groups.

There was a corresponding decrease in the percentages of the other types of cells as the age increased, seen most constantly in the lymphocyte cell percentages. The averages for all ages are of some significance, also, as Group I., partly half-caste aborigines, are not included in this table. The averages for the 413 whites are similar to those for the total 698 with the exception of a decrease in the percentage of eosinophile cells and a corresponding increase in the lymphocyte percentage. The percentage of polymorpho-nuclear cells is 58.5 as against 41.4% for the mononuclear cells (see Table III.).

Influence of Sex on Differential Blood Counts.

The groups which fell below twelve years of age were not classified by sex, but the other groups were. Table V. gives the differential blood cell percentages of Groups IV., V., VI. and VII. hospital patients, by sex.

There is apparently little difference between the white blood cell percentages in the sexes. The males show a slightly higher polymorpho-nuclear cell percentage, 64.5, than the females, 63.6, and the females a correspondingly higher mononuclear cell percentage, 36.4 as against 35.5 for males. The variations, however, are so small that they are of no particular significance.

The Percentages of Eosinophile Cells.

The percentages of eosinophile leucocytes in these Brisbane counts are of interest. They vary from 12.5% in Group I. to 4.0% in Group VII., with an average of 8.6%. All of the percentages, with the exception of that in Group VII., were above the upper limit set for normal. The children of Group I. had a percentage of 12.5 which is comparable to a percentage of 13.24 for fifty native

TABLE V.
DIFFERENTIAL BLOOD COUNTS BY SEX.

Age Group.	Sex Group.	Number in Group.	Percentage of Neutrophile Cells.	Percentage of Lymphocytes.	Percentage of Endothelial Leucocytes.	Percentage of Eosinophile Cells.	Percentage of Basophile Cells.
12 to 18	Males	9	64.0	26.0	5.2	4.6	0.2
	Females	9	56.3	30.1	6.0	7.5	0.1
	Both sexes	18	60.1	28.1	5.6	6.0	0.2
19 to 40	Males	36	58.3	30.5	5.9	4.9	0.4
	Females	54	59.0	30.4	5.5	4.8	0.2
	Both sexes	90	58.7	30.4	5.7	4.9	0.2
41 to 60	Males	29	59.2	30.5	4.5	5.5	0.3
	Females	21	56.6	33.9	5.4	3.9	0.2
	Both sexes	50	58.1	31.9	4.9	4.9	0.2
Over 60	Males	18	59.2	30.7	5.7	4.2	0.2
	Females	12	62.3	28.0	5.4	3.8	0.4
	Both sexes	30	60.4	29.7	5.6	4.0	0.3
From 12 years up	Males	92	59.3	30.1	5.4	4.9	0.3
	Females	96	58.7	30.8	5.6	4.7	0.2
	Both sexes	188	58.9	30.6	5.5	4.8	0.2

children of New Guinea and 10.5% for thirty-nine Northern Territory children reported by Breinl and Priestley.⁽⁵⁾⁽⁶⁾ These authors summarized their own and previous findings and concluded that eosinophile excess was a feature of tropical climates. Brisbane has a sub-tropical climate and residents should have a somewhat lower eosinophile percentage than that found in residents of hotter climates. This is found to be true when the ninety-seven Brisbane school children are compared to Breinl and Priestley's one hundred and fifty North Queensland school children (see Table I. and Table II.). The Brisbane percentage of eosinophile cells was 5.9 as against 7.7 for the more northern children. The eosinophile counts made by Fairley in Melbourne were well within the usual European limits. The general average of 8.6% for the 698 counts is higher than might be expected, due to the inclusion of the children of Group I.; the average of 5.8% of eosinophiles given in Table V. is probably nearer that to be found in the general population.

The variations in eosinophile percentages were very large (Table I.). In Group I., from which children with intestinal helminths were excluded, the variations were from 65% to 1%. There are probably many more factors influencing this per-

centage than are usually recognized. Table IV. also shows a decrease in this percentage with advancing age.

Differential Blood Counts in Filariasis.

Blood counts were also made on blood smears from people infected with microfilariæ. These persons were classified as were the non-infected and were found to belong to all the classes of Table I., with the exception of Group II. The results of the counts, with the maximum and minimum percentage in each instance, are given in Table VI.; the average results of the counts on the 698 persons of Table I. were included for comparative purposes and the grand average for the 914 counts was computed.

There was very little difference between the averages of the 216 people with filariasis and those for the 698 non-infected persons. There was a small increase in the percentage of eosinophile cells and a decrease in the percentage of lymphocytes in the infected persons as compared to the non-infected. The percentage of polymorpho-nuclear cells in the "A" groups was 63.9 and of mononuclear cells was 36.1 as against the corresponding figures in the non-infected groups of 60.9% and 39.0%. The high eosinophile percentages described for filariasis in most text-books were not found in this series.

TABLE VI.
DIFFERENTIAL BLOOD COUNTS IN SEVEN GROUPS OF RESIDENTS OF BRISBANE WHO WERE INFECTED WITH FILARIASIS.

Group Number.	Age of Group.	Number of Persons.	Percentage of Neutrophile Cells.			Percentage of Lymphocytes.			Percentage of Endothelial Leucocytes.			Percentage of Eosinophile Cells.			Percentage of Basophile Cells.		
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.
1A	5-14	30	74.0	30.5	47.8	50.0	10.0	27.5	18.0	3.0	2.7	40.5	7.0	16.0	2.5	0.0	0.5
3A	1-11	33	65.0	30.5	47.2	50.0	10.0	27.4	18.0	2.0	7.5	40.5	2.0	17.2	2.5	0.0	0.6
4A	12-18	60	79.0	35.0	52.8	61.0	12.0	31.9	17.5	1.0	6.7	25.0	0.0	8.9	4.0	0.0	0.5
5A	19-40	46	80.0	37.0	56.9	43.5	16.0	30.0	10.5	0.0	5.6	18.5	1.5	7.2	2.5	0.0	0.3
6A	41-60	25	72.0	44.0	56.8	47.5	20.0	30.6	11.0	2.0	6.1	12.0	1.0	6.1	1.5	0.0	0.4
7A	Over 60	22	71.5	35.5	57.6	48.0	10.5	29.0	11.0	2.0	6.0	18.0	0.5	7.0	2.5	0.0	0.4
—	All ages—Infected with Filariæ	216	—	—	53.0	—	—	29.5	—	—	6.6	—	—	10.4	—	—	0.5
—	All ages—Free of Filariæ (see Table I.)	698	—	—	52.0	—	—	33.0	—	—	6.0	—	—	8.6	—	—	0.3
—	Grand Total	914	—	—	52.2	—	—	32.0	—	—	6.3	—	—	9.1	—	—	0.4

Conclusion.

The grand average for the entire 914 counts was 52.2% neutrophile cells, 32.0% lymphocytes, 6.3% endothelial leucocytes, 9.1% eosinophile cells and 0.4% basophile cells.

From the results here reported it would seem that the following percentages would be about the "so-called" normal for Brisbane residents:

Polymorpho-nuclear cells	{ neutrophile cells	45 to 60
	{ eosinophile cells	4 to 13
	{ basophile cells	0.2 to 0.5
Mononuclear cells . . .	{ lymphocytes	28 to 35
	{ endothelial leuco-	
	{ cytes	5 to 8

Acknowledgments.

Thanks are extended to medical superintendents of hospitals and head teachers of schools visited for their cooperation in this work, and to those members of the staff of the Australian Hookworm Campaign who did the enormous amount of microscopical work necessary.

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PUERPERAL SEPTICÆMIA: SOME OBSERVATIONS ON ITS ÆTIOLOGY, TREATMENT AND PROPHYLAXIS.¹

By F. S. TAYLOR-THOMAS, M.B., Ch.M., D.P.H.,
Perth, Western Australia.

MANY a tragic tale of blighted lives and desolated families might be written round puerperal septicæmia, that fell disease whose sinister presence is an ever possible result of a mother's travail. In the year 1919, the last of which I have any record, there were dead of childbirth and the diseases incidental to the puerperal state in England and Wales 3,028 women. This means to say that for every one thousand births the lives of over four women were forfeit through one cause and another incidental to the puerperal state. The exact rate is 4.37 per thousand births. The average for the

previous ten years was 3.74%. The Registrar found that the increase was preponderatingly due to septic disease, the rate of which for that year had been the highest since 1905, reaching the high figure of 1.76%.

The number of births in Western Australia for the years 1922 and 1923 was 8,131 and 7,854 respectively. In each year, according to the Government Statistician's figures (but not according to those of the Commissioner of Public Health which are much higher) the number of deaths from puerperal septicæmia was eight. Assuming the Government Statistician's figures to be correct, the mortality rate from this cause for 1922 was a little under one per thousand and for 1923 a little over one per thousand. The total number of deaths from the puerperal state was forty-four and thirty for those years. Hence the puerperal septicæmia mortality ratio to total deaths in 1922 was 18.1% and for 1923 27%. In England and Wales for 1919 it was roughly 40%.

Purdy (*THE MEDICAL JOURNAL OF AUSTRALIA*, January 15, 1921) compares the figures for the total maternal mortality in the period 1911-1914 in England and New South Wales. The mortality rate in England and Wales was four per thousand births, whereas the rate in New South Wales was seven per thousand. In both cases one-third of the deaths was due to puerperal septicæmia. He attributed the high mortality rate in New South Wales to the defective requirements of the law relating to midwives. He said that the practice of midwifery was more and more passing into the hands of midwives and that the doctor was becoming more and more a consultant as far as childbirth was concerned.

I think I can say without indulging in needless polemics, that the life of a mother is one of the most precious in the community. To lose that life through the birth of a child, either as an immediate or a remote result, is a calamity to her family, her accoucheur and the community. And those of us who have had a patient die of puerperal septicæmia, to see the mother dying before our eyes despite all our efforts to save her, will never forget the experience. And he who says that it has never come his way, either has had but a limited experience in midwifery or he has been born under a particularly lucky star. The exhausting rigors, the high, sustained temperature with but slight remissions, the rapid change in the patient's features from one of happy health, to the drawn anxious face with pinched nose and sunken eyes and the greyish colour as the end approaches, the unduly rapid pulse, the dry glazed tongue, the "wandering" rashes and withal the oft-repeated assurance from the patient that she is "feeling better now, doctor," when all the time she is getting nearer the threshold—is a sufficiently well-known clinical picture. The mind is usually clear even up to a very short time of death, but occasionally delirium or coma supervenes; diarrhœa with offensive motions is often a terminal event; pain and tenderness over the uterus; the pain extending over the abdomen if

¹ Read at a meeting of the Western Australian Branch of the British Medical Association on April 16, 1924.

generalized peritonitis sets in, or sharp shooting pain alternating with dull, aching and throbbing pain in one or other groin indicates purulent collection either in ovary, Fallopian tube or both. In fatal cases it is all over in ten days and usually in less.

Pathology.

I shall refer to the pathology in so far as it has some bearing on treatment. The primary lesion is always a septic endometritis in cases of septicaemia. Lacerations of the cervix or perineum, while these may become septic and ultimately terminate in septicaemia, do so always by an extension upward of the infective process to the endometrium. More usually they terminate in pelvic cellulitis and perhaps abscess. But the placental site is nearly always the point of entrance for all varieties of puerperal fever. It is favourably placed for aseptic healing if no organism be present. But in the presence of infection it is most unfavourably situated in a cavity with only a potential outlet and every blood clot closing a venous sinus is for bacteria an excellent nidus at body temperature. From the endometrium the infection may spread in the first place by direct continuity of tissue to the uterine muscle and cellular tissue of the broad ligament. These are the milder cases and the ones most amenable to treatment and result usually in slow recovery taking place. The patient may have to face complications in the shape of the pelvic cellulitis and suppuration above referred to or a suppurative salpingitis or oophoritis or suppurating wounds of the perineum or vagina, or after a slow recovery extensive pelvic adhesions which tie the uterus down in unnatural positions, kink the bowel and otherwise distort the anatomy and impair the function of the organs concerned. The acute stage in these cases is characterized by few if any rigors, but more pain.

The second group of more serious cases are those in which the spread is via the lymphatics and as the lymphatics of the uterus communicate with the peritoneum, a peritonitis may result. This peritonitis is nearly always localized as a pelvic peritonitis or a parametritis, but in a number of cases it is generalized from the first. Pelvic peritonitis is the commonest local lesion in puerperal septicaemia and is accompanied by local inflammations in the pelvic organs, an ovarian abscess being especially prone to develop. A pyosalpinx more rarely.

In the third group of cases the spread is via the blood stream; that is a thrombosis of the uterine veins at the placental site is followed by a thrombosis of the ovarian or internal iliac veins, these thrombi becoming infected and giving rise to thrombotic septicaemia, more commonly known as pyaemia. These cases are much more rare than either of the other forms. They are marked by rigors at irregular but frequent intervals with wide excursions of the temperature, each rigor being accompanied by a drenching perspiration and associated with the clinical manifestations of metastatic abscess formation in one or other situation. In this group

the condition is especially fatal. Arthritis, pleurisy, pericarditis, pneumonia, meningitis, lung and brain abscess, skin abscesses *et cetera* may be mentioned among the sequelae.

Ætiology and Treatment.

Both the ætiology and treatment of the condition have been the subject of more controversy than almost any other condition in the realm of surgery or, at least, obstetrics. Regular "schools" have grown up—the "auto-infection" school in regard to causation and the surgical school and the non-surgical school in regard to treatment. There are those who belong to these schools with as much partisanship as a member of Parliament votes with his party in politics, as though the "school" was of more importance than the interests of the patient.

It is of interest to review some of the correspondence that was written round the subject after the publication of the editorial in *The British Medical Journal* dealing with the vital statistics referred to in the earlier part of this paper. It was pointed out in this editorial that the Registrar-General remarked that the increased death rate was preponderatingly due to septic disease and attention was drawn to the preventable nature of these diseases. This was followed up by Blair Bell who read a paper to the British Medical Association. This paper was entitled "The Prevention and Treatment of Puerperal Infections" in which the poor old general practitioner came in for his usual drubbing, and Blair Bell added insult to injury by stating that the cases attended by doctors were more often followed by puerperal sepsis than those attended by nurses alone. And he launched his prophylactic dictum, heard since the days of Smellie: "No meddling midwifery—no manual or instrumental interference if it can possibly be avoided" and scrupulous asepsis, of course. In stressing "unnecessary interference" he makes allowance for the "excessive indulgence in athletics and mental excitement of women nowadays, with the resultant resistant pelvic floor and inability to tolerate a normal, let alone sustain a tedious inert labour." While giving it as his opinion that the general practitioner is surprisingly expert with the forceps, he thinks that the good done is more than counter-balanced by the harm and using them for what may be termed humanitarian motives—to save a mother pain or appease an anxious husband—is moral cowardice. He says also that many practitioners make a practice of terminating with the forceps nearly every labour they undertake, more often than not with forceps taken from a midwifery bag which is far from clean and very imperfectly sterilized and that it should be a point of honour with all those who practise midwifery, that no parturient woman shall be examined unless the examiner wears a sterilized glove and even then the examination is best conducted *per rectum*. In short, he is convinced that imperfect asepsis is largely to blame for the present mortality rate in regard to puerperal infections, to whatever extent it throws a strain on the natural defences, namely the first line of defence—the lactic acid

secretion of the vagina and the second line of defence—the leucocytosis always present at the end of pregnancy. With Victor Bonny's theory of auto-infection he has little sympathy. While gonococcal, pneumococcal, typhoid and diphtheritic auto-infection may occur, in the vast majority of cases bacteria are carried to the site of infection by accoucheur or nurse. These bacteria, *videlicet* *Streptococcus pyogenes*, *Staphylococcus albus* and *Staphylococcus aureus*, *Bacillus coli communis* and *Bacillus aerogenes capsulatus* are normal flora of the intestinal tract and perineal region. The anus, the proximity of which, according to Bonny is a serious blemish in the foresight of the Creator, and the skin surface of the vulva and hair are danger spots. "Indeed, a piece of unpurified vulval skin and hair placed in the uterus would probably be far more deadly than a spoonful of feces." Hence when interference becomes necessary, a surgical operation is to be performed and no makeshift arrangements must satisfy the doctor. Preliminary douching should never be employed, so that the acid secretion of the vagina will be preserved. The other precautions with regard to the emptying thoroughly of the larger bowel, gloves, gowns, shaving of hair and thorough purification of the parts as for surgical operation must be carried out. In reference to the treatment of puerperal infections, the chief steps are: (i.) The efficient evacuation of large pieces of placenta, efficient antiseptic irrigation of the uterus in the early stages of infection, including purification of all infected lacerations. Finger curettage should only be employed and so there will be breaking down of the protecting zone of leucocytes. Milton fluid (stable hypochlorous acid) should be used for irrigation. (ii.) Employment of autogenous vaccines or polyvalent serums. (iii.) Surgical interference in the more serious cases and if there be localized abscesses in the uterine wall, tubes or ovaries, these structures should be removed. (iv.) Prompt ligation of ovarian veins and the internal iliac veins in cases of thrombophlebitis. (v.) In general puerperal infections, intra-muscular injections of "Infundibulin" 0.5 cubic centimetre.

For the more efficient dealing with these patients arrangements should be made by local authority, the Department of Health or other adequate administrative body for their reception into a special ward connected with a gynaecological or obstetrical clinic, the whole to be part of a general scheme of base hospitals with field hospitals supplying the needs of particular districts.

This address raised a storm of protest. Many correspondents pointed out that it was a council of perfection quite inapplicable to the exigencies of the daily round and the prejudices of the average patient, for custom and usage in connexion with obstetrics dates back far beyond the first dawn of the organization and development of aseptic surgery. The busy doctor cannot find time to act as a midwife and under these circumstances frequent examination and the use of forceps are inevitable. Patients who want a doctor to act the part of a good midwife, must be prepared to pay such fees as are

quite beyond the average person. And the idea of treating forceps interference with confinement as a major operation involves a preliminary education of the public before it would stand any chance of being accepted by parturient women and their attendants, for the nurse has to give her willing cooperation. The better plan would be to leave all ordinary cases to midwives, with the doctor in the background to be called in when intervention becomes necessary and then major operation fees could be charged.

Out of the mass of correspondence on the subject the questions which naturally occur to one, are: Firstly will a staphylococcus go up into the uterus on the surface of a rubber glove as easily as on a washed finger? Secondly, does examination of organisms found in cases of puerperal sepsis supply any conclusive evidence of their origin—whether from such sources as the perineal skin, the skin of the attendant, the materials used at the time or from such sources as pyorrhea or otitis in patient or attendant *et cetera*? The general practitioner is puzzled by the fact that he knows he is far more aseptic today than he was thirty years ago, yet the figures of sepsis remain practically unchanged. May it not be that our teachers are chasing a will o' the wisp with their cry of still more asepsis, when possibly what really is required is a more intelligent effort to discover the real mechanism of infection and a new technique to meet it. The Chief Resident Medical Officer of Perth Hospital has shown that, in the last two years the patients with septicæmia admitted into the institution have been treated by all known methods with equally disappointing results. These methods are based on the different theories of causation. And besides, all talk of aseptic midwifery is beside the mark under the ordinary conditions of practice.

We must not lose sight of the fact that a confinement is one of the outstanding events of a woman's life and largely a subject of conversation with her friends. The medical attendant who can give her a good hope of freedom from severe pain during that time without unusual risk, is gratefully thought of. Delivery under anaesthesia is generally indefinitely prolonged without instrumental help. And, one might reasonably ask, to what extent is it definitely proved that septicæmia is increased by such methods expertly carried out? Is it not of some value to the State for a woman to be able to say that a confinement is "not so bad after all" and that she would not mind going through it again? Just consider the following table of falling birth rates and woman's repudiation of her paramount duty (see Table I.).

Compare the increasing Asiatic rates with these and the ultimate conclusion is self-evident. The whole subject of prophylaxis bristles with difficulty. Apart from the uncertainty of the real nature of infection we are confronted by the conditions adverse to true asepsis in which the overwhelming majority of labours are conducted: Bedrooms loaded with furniture and oddments, huge beds filling little rooms, lack of clean linen, resentment

TABLE I.

SHOWING NUMBER OF BIRTHS PER THOUSAND OF POPULATION
IN VARIOUS COUNTRIES AT DIFFERENT PERIODS.

Country.	1840—1880.	1912.	Later Date.
England ..	35%	26%	18.1% (1919)
Denmark ..	32.5%	25%	
Germany ..	39.1%	27.5%	14.3% (1918)
Austria ..	39%	31%	
Italy ..	37.8%		17.9% (1918)
Belgium ..	32.7%	22.6%	
France ..	32.3%		12.1% (1919)
W. Australia ¹			

¹ The figures for Western Australia are 29.4% for 1913 and 24% for 1922.

on the part of the woman at having the "house turned upside down" in the efforts to convert a bedroom into a passable lying-in room and opposition on the part of the nurse to any enterprise shown in this direction.

The following table (see Table II.) is interesting from several points of view. It contains Bertillon's figures (pre-war) for the annual birth rate for one thousand women of fifteen to fifty years of age.

Verily "the rich grow rich and the poor grow children" as the song says and these figures show amongst other things not only that the obstetrician's work is not done in marble halls, but that the morally and socially lowest classes in the community are reproducing themselves with the greatest rapidity. But from the point of view of our subject while we would naturally think that every case of labour among these was a very probable case of puerperal sepsis, statistics go to show that puerperal septicæmia is very little greater among the poor classes than among the others. How much, then, do we really know about the causation of puerperal septicæmia? How far is individual incidence bound up in the general problem?

At the risk of being tedious, I have dwelt on this question of prophylaxis. In the matter of treatment, truth lies as of old at the bottom of the well and to reach it we must seek the middle course and keep away from the sides—of "non-interference" on the one hand and "meddlesome midwifery" on the other. Asepsis and non-interference should be our attitude of mind in approaching all cases of labour. But let us not make a fetish of a doctrine. There comes a time when intelligent application of the forceps, although not

TABLE II.

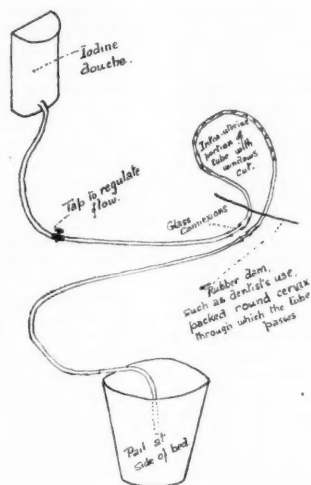
SHOWING ANNUAL BIRTH RATE FOR ONE THOUSAND WOMEN
OF FIFTEEN TO FIFTY YEARS OF AGE IN
VARIOUS CITIES.

Social Condition.	Paris.	Berlin.	Vienna.	London.
Very poor ..	104	157	200	197
Poor ..	95	129	164	140
Comfortable ..	72	114	155	107
Very comfortable ..	65	96	153	107
Rich ..	53	63	107	87
Very rich ..	34	47	71	63

actually necessary for a safe delivery, is neither moral cowardice nor a sop to an anxious husband nor a playing-up to an hysterical female, but is a humanitarian measure, designed to save real suffering and, used in this way, it will take a lot to convince me that "it does more harm than good."

I have introduced a modification in the treatment of puerperal septicæmia for which the claim of originality is made, if nothing else. I have tried it in all cases of septicæmia occurring after full-time parturition, premature labours and septic miscarriages when the period has been over three months, during the last five years in some fifteen cases in all. Before I used it I rarely saved a patient with puerperal septicæmia. Since I have used this modification, I have not lost one. The last case occurred recently in a Perth suburb and one of my colleagues who is present here tonight can testify to the seriousness of the condition. This woman was delivered of a seven months' fetus which had been dead for some time before—at least a week. Sapræmia and then septicæmia followed a natural delivery.

Once I am convinced I am dealing with septicæmia I urge the removal of the patient to hospital, or failing that, the engagement of a day and night nurse. The woman is properly prepared for curettage if the lochia are offensive and after examination in the lithotomy position with a Sims's speculum for tears, condition of vulva and vagina *et cetera* the whole proceeding is carried out with rigid regard to surgical precedent. If a perineal tear is suppurating, the sutures are removed, an iodine douche is given, the cervix grasped and a gloved finger explores the interior of the uterus which, if found shaggy, is subjected to blunt curettage very gently performed. Every care is taken to get the uterus as clean as possible as gently as possible with a blunt flushing curette at a low pressure using iodine douche at 46° C. (115° F.). This completed I now insert a rubber loop, preferably of larger calibre than douche tubing, fitted with glass connexions and about forty-five centimetres (eighteen inches) long. This tube has windows cut in its intra-uterine portion. The limbs of the loop project through a rubber dam such as dentists use. After sterilizing this loop and the dam I adjust the size of the loop to the size of the uterus or, rather the intra-uterine capacity and then, but not before, cut the holes in it, so that none of these are outside the uterus. The loop is now inserted into the uterus, the rubber dam on its vaginal aspect is gently packed with iodoform gauze (left *in situ* for twenty-four hours), the inlet limb is connected to the douche tubing which has a tap for regulating the flow, and the outlet limb to another piece of tubing leads to a pail at the side of the bed. The outflow from the douche can is now regulated at a drop per second, although I usually let the first two or three cans of lotion run through fairly rapidly to clear the tube and observe any leakage *per vaginam*, the patient being kept over a bedpan in case of this occurring. If properly done there should be very little or no leakage from



Diagrammatic Representation of Apparatus for Irrigation of the Uterus.

the vagina and in a few hours' time the occlusion at the cervix is completed by a plug of the mucus which effectually seals the uterus. The elasticity of the rubber tube also helps to keep it *in situ*. If the tube is too thick, it prevents the cervix from contracting. Continuous irrigation is now maintained with iodine four cubic centimetres to half a litre (one fluid drachm to one pint) of water at 37.8° C. (100° F.) or 40.6° C. (105° F.) alternating with normal saline solution for the first twenty-four hours, after which saline solution alone is used if the temperature has fallen considerably as it usually does and the rigors cease as they usually do after twenty-four hours. "Eusol" or hypochlorite solution is also an excellent irrigation medium. The uterus now begins to involute and expel the tube. If there has been no leakage *per vaginam*, there now will be some and an examination will show that the tube is partly or wholly expelled into the vagina. More often carelessness on the part of the nurse results in her pulling the tube out of its position, when it will need to be readjusted. Four or five days are usually sufficient for continuous irrigation in the worst cases and the improvement in the patient's condition in that time has to be seen to be appreciated. Of course, general treatment must be attended to as well as nourishment and sleeplessness I use "Luminal" 0.12 gramme (two grains) repeated hourly till effect is obtained). Stimulants must be given for the heart if necessary and attention paid to the bowels and so on. When the condition has set in as septicæmia from the first, when the walls of the uterus are smooth and involution has proceeded some distance, when there are suppression of lochia and rigors and wandering rashes, I do not curette the uterus, but merely instal continuous irrigation from the start. I also take a swabbing with a view to laboratory examination and possibly vaccine preparation, although my experience of vaccines and sera has not been such as to make me enthusiastic. In the very worst cases

with generalized peritonitis not much good can be done with any treatment, but if the treatment herein outlined has been applied at any stage prior thereto, general peritonitis will not develop.

THE ÆTIOLOGY OF ANTERIOR METATARSALGIA.

By N. D. ROYLE, M.B. (Sydney),
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State Children's Relief Board.

DISCOMFORT in the region of the heads of the metatarsal bones is usually attributed to pressure on the digital nerves. Morton believed that the disease which bears his name, was neuralgia due to compression of the digital nerves between the heads of the metatarsal bones. Robert Jones investigated the condition independently and came to the conclusion that the pain was due to the compression of nerve twigs between the metatarsal heads and the ground. Both of these explanations pre-suppose some very abnormal arrangement of the digital nerves or of the heads of the metatarsal bones and it must be admitted that pain related to the anterior transverse arch of the foot is usually though not constantly found in the presence of abnormal structure. Very commonly the heads of the metatarsal bones form with the foot at rest a distinct convexity directed towards the plantar surface of the foot. In other instances a casting reveals a depression of the heads of the third and fourth metatarsal bones or of the fourth alone.

The characteristic pain of anterior metatarsalgia may gradually develop in intensity, but is often of sudden onset and occasionally the onset is preceded by a slipping sensation. The examination of such feet reveals abnormal mobility between an adjacent pair of metatarsal heads and possibly more commonly between the heads of the third and fourth bones. In addition, even when the patient does not experience the slipping sensation, the heads of the bones may be made to slip on one another. This gives the patient a painful sensation referred to the region of the metatarso-phalangeal joints involved in the slipping and gives to the examining hand a sensation of grating as if bony surfaces were being rubbed together. The pain in this disease is often referred to one of the toes, usually the fourth. On this account many patients have lost their toes and retained their pain. One such patient whose second toe had been removed for pain referred to the distal phalanx, still complained of excruciating pain in the region of the head of the second metatarsal bone. This bone could be made to slip with distinct grating on the metatarsal bone of the great toe. A radiograph revealed a slight degree of atrophy of the head of metatarsal bone and I advised the patient to submit to operation for the purpose of determining whether or not the head of the bone was the seat of disease. When the bone was exposed at operation, there was no sign of a pathological process in it, but there was between it and the metatarsal bone of the great toe a well-defined space about three

centimetres long and two centimetres deep. This space was lined with a glistening membrane and was actually a bursa. The surfaces of the adjacent metatarsal bones were not bare, but the membranous lining of the sac appeared to fuse with the periosteum. The digital nerve did not lie within the bursa but inferiorly to it and did not present any abnormal characteristics. This observation led me to examine in a new light every foot subsequently presented by a patient complaining of metatarsalgia. I am sure that the presence of a bursa was responsible for the symptoms in the greater number. The findings in a second case confirmed this view.

A young man, nineteen years of age, had suffered with unbearable pain referred to the left fourth toe for a period of six years. The pain would begin in the region of the metatarso-phalangeal joint of the fourth toe. After the patient had been on his feet for a short time, a feeling of pressure between the heads of the third and fourth metatarsal bones accompanied the pain and could only be relieved by removing the boot. The patient sought relief because he was unable to follow his occupation as a carpenter. Examination of this foot revealed a definite degree of abnormality. Dorsiflexion of the foot was subnormal both in active and passive movements and active dorsiflexion of the foot was accompanied by hyperextension of the metatarso-phalangeal joints. When the foot was at rest, the arch formed by the heads of the metatarsal bones was depressed in the region of the heads of the third and fourth bones. Pain could be caused by lateral pressure on the metatarsal heads and the fourth head could be made to slip on the third. The range of movement between these two bones was abnormal both in a lateral and supero-inferior direction. Radiographic examination did not reveal any abnormality in this situation, but the space between the fourth and fifth bones was wider than usual. The patient submitted to operation and a small bursa was found between the third and fourth metatarsal bones. The bursa was about 1.5 centimetres long and occupied a position proximal to the head of the fourth bone. It was tightly distended with fluid.

I am not in a position to state how frequently such a bursa is present in a normal foot. Spalteholz describes bursae between the metatarsal heads of which the medial three are the most constant. The presence of a bursa in these two patients gives an explanation of pain that has not been hitherto suggested. The bursitis may not be present in every case of metatarsalgia nor do I think it necessary that every patient with metatarsalgia should receive operative treatment. The usual conservative treatment to restore the anterior transverse arch and prevent unnecessary movement between the metatarsal heads is effective in most instances of this affection.

Reports of Cases.

RETROFLEXION OF THE IRIS.¹

By A. J. MACDONALD, M.B. (Toronto),
M.C.P.S. (Ontario),
Brisbane.

R.S., a boy, aged eight years, was sent from the country on November 20, 1923, on the fourth day after an injury to the left eye. The injury had been caused by a blow

from a piece of wood. There was no penetration, but I could see a contused wound involving the sclera and limbus on the inner side of the left eye. From the history given by the patient's mother who was a very intelligent woman, I concluded that the iris had been torn by the injury and that this had been immediately followed by hyphæmia. The blood in the anterior chamber became absorbed during the first night after the injury, but while playing the following day another hæmorrhage occurred and completely filled the anterior chamber. The mother now became alarmed and after taking the boy to the local medical practitioner travelled by motor and train one hundred and fifty miles to bring the child to Brisbane. When I first saw the boy he was in great pain. The tension of the eye was + 3. The conjunctiva was chemosed and the lids were cedematous and red. The anterior chamber was filled with blood and the eye was turning outwards (exophoria). The application of eserine and hot fomentations soon reduced the pain, tension and swelling and the anterior chamber gradually became clear until fourteen days after first seeing him I could see the pupil with difficulty. The pupil was very large and the edge irregular. On the fifteenth day he had an attack of constipation, was restless and cried. This caused a third hæmorrhage which filled the anterior chamber again and raised the tension to + 3. Eserine and hot fomentations reduced the tension and pain in three days, but this time the blood was very slow in absorbing. When the anterior chamber became clear I could see that the inner surface of the cornea was stained more deeply in the lower half, the inner half of the iris was folded back on itself and the vitreous was also tinged red. His vision was confined to the perception of hand movements and everything had a red colour. He had no pain and the tension was normal, but I could not see the fundus. He went home to the country for three months on January 28, 1924.

In May, 1924, I saw him again. The vision in the right eye was 6/5 and in the left 4/60. The tension was normal. The iris was still folded back on the inner side, but not to such an extent as in January. The eye is now quiet and painless, but he is troubled with diplopia. The fundus can now be seen indistinctly. The blood staining on the cornea is clearing from the periphery. The lens is clear and in normal position. The vitreous is still somewhat cloudy. The vision in the left eye through a metal disc with a small hole in the centre and with right eye covered is 6/18. He has improved in general health and is going to school.

AMYOTROPHIC LATERAL SCLEROSIS.¹

By ELLIS MURPHY, M.B., Ch.M. (Sydney),
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A MALE patient, aged twenty-one years, a carter, had an attack of influenza about six months ago. After being up out of bed for some days he noticed weakness in his legs; some few weeks later his hands became stiff and he lost the power of performing delicate movements. Some weeks after this he noticed some alteration in his voice. He has not lost much weight, but has noticed that his hands and forearms have become wasted. His temperature is 37.2° C. (99° F.), his pulse rate is ninety and his respirations number twenty in the minute. His heart, chest and abdominal organs are apparently normal. The specific gravity of the urine is 1010, it is straw coloured and contains no sediment. The reaction of the urine is neutral, it contains no albumin, no sugar, no pus, blood or casts. His bowels act every day. The patient is a thin young man, the wasting of his forearms and hands is at once apparent. He has difficulty in raising himself in bed on account of the weakness of his arms. When he walks, he exhibits a typical spastic gait, walking as if his feet were stuck to the floor. Fibrillary twitching can

¹ Read at a meeting of the Queensland Branch of the British Medical Association on May 2, 1924.

¹ Read at a meeting of the Queensland Branch of the British Medical Association on May 2, 1924.

be seen in many muscles. A close examination of his hands reveals definite wasting of the thenar and hypothenar eminences as well as of the interossei and lumbrical muscles. This leads to the appearance of deep depressions between the metacarpal bones. The wasting of the small muscles of the hands together with the difference of tone in the extensors and flexors of the forearm leads to his hand assuming when at rest the position of claw-hand or *main-en-griffe* of Duchenne. On examination we find that there is no loss of either epicritic or deep sensation and he is able to appreciate the difference between test tubes containing hot and cold water when applied to his skin. Examination of his cranial nerves shows that the olfactory nerves are normal. Examination of the optic nerve shows that his sight is unaffected. The pupils react to light and accommodation. The pupil reaction shows some diminution in the central control; when light is applied, the pupils contract very quickly and then dilate again. The third, fourth and sixth nerves are clear, there is no strabismus or nystagmus. Examination of the fifth nerve shows that the sensory root is unaffected. The presence of jaw clonus indicates some degeneration in the corticobulbar tracts leading to the motor nucleus. The sixth nerve is clear, there is no facial paralysis or paresis. The eighth nerve is clear. There is no diminution in hearing in either ear. The presence of fibrillary twitching of his tongue and slurring of his speech points to some defects in the glosso-pharyngeal and hypoglossal nuclei. The tenth and eleventh nerves are apparently clear. The wrist jerk and the elbow jerk are definitely exaggerated. The knee jerks are exaggerated. There is definite patella clonus. Ankle clonus is present. Babinski's sign is present on both sides. His arms and legs are both spastic. Rombergism is not present. The reaction of degeneration is present in the muscles of his arms and legs. The sphincter muscles are not affected. The serum has not reacted to the Wassermann test.

REPORTS ON OPHTHALMIC CASES.

By MARK GARDNER, M.C., M.D.,

Assistant Ophthalmic Surgeon, Eye and Ear Hospital;
Ophthalmic Surgeon, Hospital for Sick Children,
Women's Hospital and Austin Hospital,
Melbourne.

Removal of Hydatid Cyst from Orbit by Krönlein Method.

R.O., *etatis* six years, was brought to the Children's Hospital in February, 1924. The mother had noticed that the right eye had been getting prominent for the previous three months. There had been no pain or signs of inflammation. On examination there was found marked proptosis of the right eye directly forwards, no limitation of movement in any direction, marked resistance to pressure on eyeball and feeling of tenseness. Intra-ocular tension was not increased. There was no pulsation or thrill.

Vision of the left eye was 6/6. The eye was emmetropic. Vision of the right eye was 6/18 and was not improved by correction. The right fundus showed papilloedema of about two diopters. The retinal veins were very engorged and tortuous; there were a few small hemorrhages. The serum of both mother and child failed to react to the Wassermann test. X-ray examination yielded no positive evidence. A month later there was definite increase in the proptosis; there was now some displacement downwards and outwards and limitation of movement upwards and to a lesser degree outwards. The papilloedema had increased; there was now well marked hypermetropia of the retina around the nerve-head, suggesting that the retina was being pushed forward as a result of pressure at the back of the globe. Treacher Collins notes this sign in his "Pathology of the Eye." I made the diagnosis of extra-dural tumour of the orbital portion of the optic nerve and decided to endeavour to remove it by the Krönlein method.

Under the intra-tracheal method of ether anaesthesia the usual semi-circular incision in the Krönlein operation was made.

The lower section of the bone flap was made with a fine wire saw after a sound had been passed along the outer surface of the frontal process of the zygoma to the orbital fissure; the upper section was made with a chisel. On swinging back the triangular bone flap and incising the periosteum the contents of the orbit were accessible and a cystic tumour could be felt within the muscle cone behind the globe. After dissecting the external rectus muscle and holding it away with hooks, the cyst was exposed lying on the temporal side of the optic nerve. In the process of dissection the cyst wall was punctured and clear fluid escaped; the adventitia was now opened and a sterile hydatid cyst was delivered; there were no daughter cysts. The cyst was about the size of the globe. The capsule was left *in situ*. The incision in the periosteum was closed with catgut and the bone flap was replaced; no drain was inserted. Apart from some oedema of the upper lid there were no complications. Now, six weeks after operation the proptosis has subsided; there is no limitation of movement. There is a certain amount of hyperphoria, but the patient has binocular vision. The papilloedema and dilatation of vessels has disappeared and vision in the eye is 6/6 partly.

The Casoni intra-dermic test yielded a strongly positive result. Blood count showed 15% eosinophilia. (The skin test was not performed until the day after operation; rather late, I admit.)

Sir John Parsons in his "Pathology of the Eye" says that hydatid cysts of the orbit are very rare (one in 136 cases of hydatid); most cases appear in young people.

Roemer in this text-book states that echinococci have been removed from the orbit in rare cases and says they excite pain and inflammation in surrounding tissues during development; this was not so in my case.

Dr. G. A. Pockley reported a very similar case at the Medical Congress, in Brisbane, in 1920.

Tuberculous Conjunctivitis.

Two patients suffering from primary tuberculosis of the conjunctiva have recently come under my notice. One, a child of eighteen months, was shown at the British Medical Association Clinical Meeting at the Children's Hospital and an account was given in THE MEDICAL JOURNAL OF AUSTRALIA of May 3, 1924.

The other, P.P., was referred to me by Dr. Hobill Cole in February last. There was a profuse purulent discharge from the left eye. The onset had been a fortnight previously with some slight constitutional disturbance and sore throat. There was no photophobia. The lower palpebral conjunctiva showed large reddish granulations; there was a shallow grey-coated ulcer on the bulbar conjunctiva just outside the limbus. The pre-auricular gland was much enlarged and tender. The cervical glands were not enlarged. No growth was obtained on culture from the discharge. Fuch's account of Parinaud's conjunctivitis exactly corresponds to the condition described. I cut a strip of the granular conjunctiva. Dr. Reginald Webster cut and examined a section and pronounced the condition undoubtedly tuberculous. In both instances an emulsion, prepared from the conjunctiva was injected into guinea pigs and rabbits. We wished to determine whether the infection was from human or bovine tuberculosis. It has been suggested that Parinaud's disease is always a bovine tuberculous infection.

There has been a local reaction in one of the guinea pigs. Further investigations are being carried on by Dr. Webster.

The condition has remained almost stationary for two months; there has been slight infiltration of the cornea at the site of the ulcer at the limbus. The parents have taken the child with them to England.

Lipæmia Retinalis.

W. McK., *etatis* twenty-seven years, was admitted to the Melbourne Hospital in August, 1923, with a history of diabetes for three years. There was a history of fall of body weight from sixty-eight to fifty-two kilograms. On admission the urinary sugar was 3.8%; the fasting blood sugar was 0.255%. Acetone and diacetic acid were present. Treatment at first was general and dietetic. On examination of the fundi I found the condition described as *lipæmia retinalis*. The colour of the retinae was salmon-pink. There was a general translucent appearance. The optic discs were waxy in appearance. The retinal arteries for some distance from the optic discs looked as if they contained milk instead of blood; a few of the smaller vessels near the periphery looked like white threads. The arteries, however, were easily distinguishable from the veins and were not flattened and ribbon-like, as has been noted in several of the cases reported. The chorioidal vessels were normal in appearance; they evidently never show any change in this condition. There were no hemorrhages or exudates. Vision was not affected. The rare condition of *xanthoma diabeticorum* was present on one arm.

The total ether soluble substances in the blood was found to be 12% and the blood cholesterol 0.8%.

During treatment for three months with thirty units of "Insulin" daily and a diet of 1,600 calories, weight returned to normal; urine became sugar-free and fasting blood sugar was reduced to 0.112%. The blood fat did not in this time quite return to normal limits. During most of his stay in hospital it was about 2%. The lipæmic appearance of the retinae quite cleared a fortnight after "Insulin" treatment had been started. The patient was discharged in December, 1923.

The earliest accounts of condition of blood to which the term lipæmia is applied are by Rollo in 1798 and by Mariet, of Edinburgh, in 1799. The ophthalmoscopic picture which is associated, was first seen and described by Heyl, of Philadelphia, in 1880. Apart from a blood examination there is no other means of diagnosing lipæmia than by ophthalmoscopic examination. Since the original case there have been twenty-nine cases described in the literature. In an article on *lipæmia retinalis* in this journal of December 29, 1923, a recent paper by Gray and Root was quoted; they found the average age of twenty-four patients with the condition was twenty-five years. The fat content of nineteen of the patients averaged 9%, the highest was 26.5% and the lowest 3.5%. The blood sugar in cases reported since 1921 average 0.34%.

I must thank Dr. R. R. Stawell for giving me permission to report this case and Dr. Charles Kellaway for supplying the details of the blood examinations.

Reviews.

GYNÆCOLOGY FOR STUDENTS.

In the fifth edition of "A Short Practice of Gynæcology" Henry Jellett endeavours to bring his account of the subject up to date.¹ The main strength of the book lies in the section devoted to pathology which has been fully treated. The text in this section is invariably good and it is fortified by many illustrations and exceedingly instructive micro-photographs.

The classifications are well handled and the style is vigorous and clear. A pleasing feature is the inclusion of the derivation of the various terms used. In connexion with nomenclature it seems an error to call a volsellum an American forceps, for to say the least this is not a generally accepted term.

It is difficult to understand why a chapter on cystoscopy should be introduced. This chapter is quite insufficient for the demands of modern urology and would have been better eliminated.

The operative procedures are on the whole well described and illustrated, but this chapter is open to some criticism.

In his description of salpingectomy the author only advises resection of the interstitial portion of the tube in certain conditions, whereas most gynæcologists recommend it in all cases. The amount of broad ligament included in each clamp and ligature would appear to be altogether too much for safety.

In describing external shortening nowhere is mention made of Alexander or Adams. Students should surely be taught to understand what is meant when reference is made to an Alexander-Adams operation.

In the modification of the Gilliam operation selected for description all the faults of the original operation are retained; three apertures for internal hernia are left and by bringing the round ligaments through the anterior sheath of the rectus there is the possibility of sloughing or pain.

No mention is made of the possible uses to which diathermy may be put and therapeutic X-rays are not even mentioned. This seems a serious omission. The index is moderately satisfactory.

PARENCHYMATOUS KERATITIS.

THE monograph by Holmes Spicer on interstitial keratitis is probably the best and most complete account of this disease in the English language. The author is, moreover, no mean artist. So we have the advantage of pencil sketches of practically every stage in the protean appearances of the cornea. These emphasize better than any coloured pictures the changes of form of the opacities from leucocytic infiltration to permanent vessel-tracks. They are indeed very beautiful and entirely adequate.¹

What especially strikes the reader of this paper is that it carries on so well the British tradition of scientific writing. That is, it is no compilation, as so many American contributions are, but is a plain and straightforward account of the author's own observations, carried out over many years, of some seven hundred cases.

The only point on which we feel inclined to join issue with the author, and we do so with diffidence, is in his pessimism in regard to treatment. We believe, while endorsing all he says about hygiene, that, where a quick response to specific treatment does not occur, it is due to insufficient dosage and that in the severest cases intensive treatment either with mercury by inunction, or a full and rapid course of "Salvarsan" or preferably both will produce an almost magical effect. The author also says that much of the discomfort of the patient is due to atropine poisoning. We have not noticed this, but it may be well to bear the warning in mind. Also, in a disease so essentially one of the mesoblastic tissues, we should hesitate to use eserine, as the author recommends in cases where there is no evidence of iritis. Our view is that atropine should be used in all cases.

Despite those minor criticisms we can compliment the author no less on this monument of industry and careful observation than on his delightful literary style and on the temperate way in which he expresses his views and opinions. The monograph should be in the possession of every practising oculist. Neither the wealth of material nor the ability and devotion necessary to digest it is at the disposal of most medical practitioners.

¹"A Short Practice of Gynæcology for Medical Students," by Henry Jellett, M.D. (Dublin University), F.R.C.P.I.; Fifth Edition; 1924. London: J. and A. Churchill; Royal 8vo., pp. 450, with 318 illustrations and ten coloured plates. Price: 18s. net.

¹"Parenchymatous Keratitis: Interstitial Keratitis: Uveitis Anterior," being the Gifford Edmonds Prize in Ophthalmology, by W. T. Holmes Spicer; 1924. London: George F. and Sons, Limited; Royal 8vo., paper cover, pp. 65, with 41 illustrations. Price: 5s. net (to subscribers to the *British Journal of Ophthalmology*, 3s. 6d. net).

The Medical Journal of Australia

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Factory Inspection.

It has been said that factory inspection is accepted by the average citizen in the same way that he accepts street lighting or main drainage. He looks on it as a necessity of civilized life, a little expensive perhaps, but one that presents no definite problem and is not based on any particular underlying principle. He forgets that it was the intolerable sweating conditions associated with the employment of women and children in the earlier part of the nineteenth century which first led to the appointment of inspectors in an attempt to cope with the evil. The history of factory inspection is interesting. Although a Factory Act was passed in England in 1802, it was not until 1833 that Government inspectors were appointed. The officials holding their appointments under successive acts were gradually increased in number and various methods of administration were tried. The establishment of the Medical Branch of the Home Office (Factories) represents the first step in the evolution of modern industrial hygiene. Control under local authorities was not found to be nearly as effective as that of a central body. Subsequently similar measures were adopted on the Continent and in America. The whole question, however, has undergone a process of evolution. It has been recognized in increasing measure that legislative enactments are necessary for the protection of the worker against the hazards to health and safety occasioned by his work. The medical hygienist sees in factory inspection only an additional weapon to be used in the service of preventive medicine, the goddess whom he serves. The employer is perhaps a worshipper of Mammon and regards it as a means of increasing his output. The worker may be a worshipper of self and be happily content with the more comfortable conditions. The legislator perchance cares alone for the plaudits of the *vox populi* and recog-

nizes a good vote catching expedient. In spite of these varying points of view, however, it is and must remain an indisputable fact that protection of health is the chief and dominant aim of factory inspection.

That the question is regarded as one of fundamental importance may be gathered from the fact that it occupied the whole attention of the Fifth International Labour Conference held at Geneva in October, 1923, in accordance with the provisions of the Treaty of Versailles. An account of the proceedings of the Conference has been published in the *International Labour Review*, an authoritative publication issued under the auspices of the League of Nations. Factory inspection has been considered at successive conferences and an effort is being made to establish an international code which will cover "very important matters in the sphere of labour conditions." It is hoped that by these means conditions which involve "injustice, hardship and privation" to large numbers of people will be ameliorated, for these undoubtedly imperil the peace and harmony of the world. Although the subject was considered along these broad lines, many of the points discussed are of extreme interest to students of industrial hygiene.

In the Committee of Conference which dealt with the sphere of inspection, emphasis was laid on the fact that it is concerned with the hours of labour and rest from labour, with the conditions under which night work is permissible and with the determination of the class of workers for which it is suitable. It is also concerned with dangerous and unhealthy work and the general question of hygiene and safety. In the draft presented to the Committee it was suggested that one of the accessory duties of the inspectorate should be the examination of plans for proposed factories and work places from the point of view of insuring the health and safety of workers employed in them. The proposal was also made that this should be one of the principal duties of inspectors. The Committee did not see its way to accept the suggestion, but indicated in its recommendation the importance attached to it by a number of members. This is unfortunate, for there can be no doubt that suitable construction

is as important to the well-being of the workers as a proper foundation is to the building itself. The Committee which considered the powers of inspectors, recommended that they should have the "right of entry," the right to question without witnesses members of the staff and to examine the registers of all establishments. In view of the differences in international law some difficulty was experienced in determining the exact rôle to be played by inspectors in the infliction of penalties. It was claimed that to give inspectors power to issue orders which must be obeyed as such, subject to recourse to the courts on the part of the employer, was incompatible with the law and usage in Anglo-Saxon countries. In the final recommendation adopted by the Conference provisions were therefore inserted to allow conformity to the statutes of different countries. The question of safety and prevention of accidents was discussed at length. It is of considerable importance and will be referred to in a subsequent issue.

In regard to the organization of the inspectorate it was pointed out that independence and impartiality could best be obtained by placing inspectors under the control of a central body and not under local authorities. The latter are often influenced by considerations which have little to do with the true aim of inspection. It was further resolved:

That in view of the difficult scientific and technical questions which arise under the conditions of modern industry in connexion with processes involving the use of dangerous material, the removal of injurious dust and gases, the use of electrical plant and other matters, it is essential that experts having competent medical, engineering, electrical or other scientific training and experience should be employed by the State for dealing with such problems.

No comment on this resolution is necessary. Its soundness is obvious. Science applied to industry has been of enormous value in extending both its possibilities and its production. When applied to the individuals engaged in its pursuit it should not be less successful.

The training of experts in industrial hygiene is a matter which will require attention in Australia in the near future. It is well for medical practitioners

to understand what it stands for, what some of its problems are and what steps can be and have been taken to solve them. Cooperation will make possible the realization of ideals.

Current Comment.

BLOOD CHANGES WITH TUMOURS OF BONE.

In February, 1923, we drew attention to the important investigation carried out by Dr. Alfred Piney on carcinomatous metastases in bone. In the course of his work at that time he referred to the condition of pseudo-pernicious anæmia associated with malignant disease. He pointed out that there was an interference with the erythropoietic system, causing a reduction in the number of cells, and that there was something in the nature of a stimulating effect on the leucopoietic system, causing a leucocytosis.

Dr. Piney has recently recorded three cases of this type of anæmia and discussed several aspects of the condition.¹ He refers to a condition described by Ehrlich in 1878 as pernicious anæmia in a patient suffering from a malignant tumour of bone as the first report of "metastatic anæmia" available in the literature. He reviews cases reported by many authors and points out that the blood pictures resembled that of pernicious anæmia; but that there was invariably a leucocytosis and no lymphocytosis, either relative or absolute. In one patient, however, referred to by Bizzari, the blood picture resembled that of leuchæmia rather than that of pernicious anæmia. In one of Dr. Piney's three patients a similar change was found, but the presence of leuchæmia was excluded with certainty at the autopsy. This finding is interesting on account of the view held by many that leuchæmia is really neoplastic in nature. The primary tumours in the three patients described by Dr. Piney were respectively carcinoma of the stomach, spindle-celled sarcoma and "hypernephroma." He points out that the changes in the composition of the blood do not depend upon the site of the primary tumour and that the type of the primary tumour is not of material importance.

It is obvious that from the clinical standpoint difficulties are likely to arise in regard to the differential diagnosis of metastatic anæmia and pernicious anæmia on the one hand and leuchæmia on the other. In pernicious anæmia the colour index is usually high and in metastatic anæmia this is not always so. Dr. Piney points out that the invariable occurrence of granulocytic leucocytosis is strong evidence against pernicious anæmia. Anisocytosis occurs in both metastatic anæmia and pernicious anæmia, but in the former the large non-nucleated red corpuscles are pale and usually polychromatophilic, in the latter the majority are orthochromatic. Again the large nucleated red cells in the former present pale, polychromatophilic

¹ *The British Journal of Surgery*, April, 1924.

nuclei of the normoblastic or "cart wheel" type, in the latter condition the orthochromatic cells present finely reticular nuclei. The differential diagnosis from leucæmia may be a matter of some difficulty. It is useful to remember, however, that there is almost invariably present in leucæmia an increase in basophile leucocytes and that there is no definite increase of these cells in metastatic anæmia. Finally Dr. Piney makes the not unreasonable statement that it is difficult to explain the identity of the blood pictures produced by sarcomata and carcinomata of bone, unless the hæmatogenous origin of carcinomatous bone metastases is accepted.

SPEECH AND CEREBRAL LOCALIZATION.

IN the further pursuit of his studies on aphasia Dr. Henry Head has now published a preliminary statement of the results at which he has arrived on the question of speech and cerebral localization.¹ But in this matter of localization, those who read in the hope of finding centres sharply and strictly defined, will be disappointed, because as Dr. Head says with full emphasis there are no centres for speaking, reading, writing or other forms of behaviour bearing on language. Even the motor cortex is not the seat of strictly limited centres. Reference to the work of Sherrington and his colleagues shows that excitation of a point in the motor cortex produces varying responses, facilitation, reversal and deviation. And since this applies to motor cortex, how much more must it apply to cortex concerned with speech, an acquisition which belongs to a wholly superior level, which is controlled not by a single function, but by a highly organized group of functions, no one of which is dominant or subservient to the other, all being equipollent in the hierarchy of cerebral activities. As further concerns localization, it is clear to all disciples of Hughlings Jackson, amongst whom Dr. Head stands foremost, that failure properly to appreciate the nature of the speech defects produced by local lesions has been responsible in the past for much disappointment and waste of effort. It has not been recognized that a lesion does not remove a strictly definable anatomical centre, but does negatively disturb a highly organized act. And innumerable clinical observations have shown that it is fundamentally wrong to classify aphasia, as "motor," "visual" or "auditory" and to seek an anatomical site for each, because when the use of language is disturbed, the loss shows itself in terms of the complete act; it does not disclose the "elements" out of which the act has been built.

To the group of functions which suffer in disorders of speech, Dr. Head has applied the empirical designation "symbolic formulation and expression," which means the employment and manipulation of such symbols as words and numbers and though there are not centres for speech, there are areas of the brain within which structural injury can produce disorders of symbolic formulation and expression, manifested in diminished capacity to employ words and figures in certain ways and

under certain definite conditions. Better to understand this we must refer to Dr. Head's previous clinical research wherein records of aphasia appear divided into four categories: (i.) "Verbal defect," in which the patient has difficulty in finding verbal forms in which to express his thoughts; they are exemplified in severe form by the "yes" and "no" types of aphasia with which most are familiar; (ii.) "syntactical defect," in which syntax suffers and jargon is talked. Words are plentiful, but their production is ataxic. (iii.) "Nominal defect," wherein the loss is essentially one of the use of names and of the meaning of words and other symbols. The patient fails to name objects placed before him. Reading and writing and drawing from memory are gravely affected, but power to repeat *viva voce* is retained. (iv.) "Semantic defect," whose loss consists in a want of recognition of the full significance of words and phrases apart from their verbal meaning. The patients may understand the words "summer" and "time," but cannot say whether the *Daylight Saving Act* puts the clock forward or back. They cannot formulate accurately what they are told nor what they read and cannot interpret a picture or see a joke. In all these defects it is fundamentally important to remember that the condition is not static; the extent and severity of the aphasia may fluctuate. Careful examination, however, will always show that the specific variety of aphasia abides.

Returning to localization Dr. Head points out that ideal conditions for the purpose are rare. These would be chronic aphasia in persons in the prime of life, examined at frequent intervals, who had died from some cause unconnected with the central nervous system. Not having such patients he had to be content with selected material provided by gun shot wounds of the head. His proceeding for localization, briefly stated, was as follows. The extent, position and shape of the wound, verified as far as possible by measurements and an X-ray examination, were recorded as a diagram. Then with the assistance of Professor Elliott Smith these records were transferred by special methods to cadavers with heads of corresponding size and shape and the needful observations made. The outcome was that in persons with "verbal defect" the wound was found to lie over the lower portion of the left central gyri and the parts beneath them, while "syntactical defects" were produced by wounds over the left temporal lobe. So far the anatomical conclusions do not diverge materially from those of former observers and the localization is close.

Concerning "semantic" and "nominal defects," however, the results lack precision. The material was unsuitable for strict localization, because the injuries were too diffuse and the limits of areas hard to define. It is sure only that these defects are evoked by unilateral lesions situated between the post-central fissure and the occipital lobule, a field which includes the supramarginal and angular gyri; probably the lesion producing "nominal defects" lies behind that producing "semantic defects."

¹ Brain, November, 1923.

Abstracts from Current Medical Literature.

PHYSIOLOGY.

Action of Histamine Upon Gastro-Duodenal Secretions.

R. K. S. LIM, A. R. MATHESON AND W. SCHLAPP (*Quarterly Journal of Experimental Physiology*, November, 1923) have studied the effect of histamine upon the secretions of the stomach and duodenum using a new method for the collection of samples from the stomach and duodenum. Two small bore rubber tubes each provided with an Einhorn perforated metal tip at one end and marked respectively at fifty-five centimetres from the tip and one hundred and five centimetres, are swallowed so that the tip of one lies in the stomach and the tip of the other in the duodenum. The free ends of the two tubes are attached to a pump through a small collecting flask and continuous suction is applied. The gastric and duodenal contents are thus collected in separate flasks which are changed at intervals of ten minutes. The subject is asked not to swallow his saliva. A number of healthy subjects were examined, analyses being made of the overnight juice, that is that obtained after a normal night's fast, the basal or fasting juice and the juice following the injection of histamine. The overnight juice averaged fifty-two cubic centimetres; active hydrochloric acid 0.15 gramme per centum, pepsin 0.369 gramme per centum, mucus and occasionally bile. The analysis of the overnight juice gives no information regarding the secretory state of the stomach; the amount of juice depends on the tone of the stomach and its holding capacity. The basal or fasting juice averaged twelve cubic centimetres in ten minutes, active hydrochloric acid 0.185 gramme per centum, pepsin 0.544 gramme per centum; bile *et cetera* should be absent. There was a good deal of variation in the acidity of the basal juice, from 0.029% to 0.409% of active hydrochloric acid. In more than half the cases observed regurgitation of duodenal contents was absent and yet a low active hydrochloric acid percentage was obtained. The effect of injections of histamine is in general to increase the rate of secretion and the amount of acid and pepsin. The histamine response appears within fifteen minutes of the injection, the average latent period being seven minutes. The average hydrochloric acid percentage is nearly doubled after histamine, except in the case of persons showing extremes of basal percentages. The stomach seeks to establish a maximum or optimum percentage of acidity during its secretory response. The actual response in each case is therefore governed by the level of the basal output. The average acidity was 0.346 gramme per centum; this and actually lower figures in individuals were obtainable

in the absence of duodenal regurgitation. The acidity of freshly secreted juice is seldom as high as 0.5% hydrochloric acid, the commonly accepted figure. Atropine, applied locally, in doses up to 0.0026 gramme of the sulphate is ineffective in inhibiting the histamine response. Subcutaneous injection is also without effect. Histamine has no direct action on the duodenal, pancreatic or biliary secretions, but under normal conditions it stimulates these secretions indirectly when the acid of the gastric response escapes into the duodenum.

Distilled Water Fever.

FLORENCE SEIBERT (*American Journal of Physiology*, December, 1923) has investigated the fever which results from the injection of some samples of distilled water. She was not able to take for granted that a physiological saline solution made by dissolving "C.P." salt in distilled water from a tank and then autoclaving, is physiologically inert. The fever resulting from the intravenous injection of distilled water is not dependent upon the rate of injection of the water. Hemolysis of the blood and hydrogen ion concentration of the solutions higher or lower than that of the blood are not the causes of fever. Impurities such as inorganic salts, glass dissolved from the container, gases from the air, constituents of the cork stopper have all been excluded as probable factors in fever. Water can be assured to be non-pyrogenic by distilling it through an all-pyrex apparatus containing a spray catching trap and using it within twenty-four hours. The pyrogenic substance may develop in water in four to five days, is filterable through a Berkefeld filter and is destroyed by long drastic heating only. All the evidence indicates that the pyrogenic substance is a filterable, heat labile, non-volatile product of bacterial origin. An organism has been isolated from distilled water which was pyrogenic and which when added to freshly distilled sterilized water makes it pyrogenic. The cultural characteristics of this organism are given. Filtrates from other bacteria isolated from both pyrogenic and non-pyrogenic waters did not give fever. It would seem that the important step in preserving good water rests in the immediate sterilization after distillation and preservation of the water in sterile containers.

"Insulin"-like Material in Tissues.

C. H. BEST, R. G. SMITH AND D. A. SCOTT (*American Journal of Physiology*, April, 1924) have examined tissues of the body other than the pancreas for the presence of "Insulin" or "Insulin"-like material in normal and depancreatized dogs and in dogs after anaesthesia. They find that "Insulin" is present in liver, muscle, thymus and blood and other tissues even in completely depancreatized dogs. It is present in smaller amounts in the tissues of dogs which have been subjected to ether anaesthesia, than

in the tissues of normal or diabetic dogs. The "Insulin"-like material in diabetic tissue appears to possess the same chemical and physiological properties as "Insulin." "Insulin" administered *per os* to a diabetic dog may be recovered almost quantitatively in the urine of the animal. Since this material must pass through the blood stream and since it exerts no influence on the blood sugar of the animal, it must exist in an inactive state in the blood. The "Insulin" may either be present in a comparatively inactive form in the diabetic tissues or some condition may exist in these tissues which inhibits the action of the "Insulin." In view of the results obtained and the fact that "Insulin"-like material has been obtained from plant tissues, they believe that "Insulin" may prove to be a constituent of every cell in which carbo-hydrate is metabolized and that the islands of Langerhans may prove to be specially developed structures which supply the active material when the demand for it is too great to be met by the "Insulin"-producing power of the individual cell.

Effect of Coloured Backgrounds on Colour Fields.

A. D. BUSH AND R. S. MCCRAIDIE (*American Journal of Physiology*, March, 1924) have endeavoured to ascertain whether the colour quality of the background modified to any extent the area of the colour field in the retina. They find that the extent and contour of the retinal field for the four colours—blue, red, green and yellow—vary with the background on which the stimulus colour is observed. The colour field, when the stimulus colour is observed on a like background, is much contracted with red, considerably contracted with blue, somewhat contracted with green. The colour field for either blue or yellow is greatest when red is the background; for red when blue is the background; for green when either white or green is the background.

The Effect of "Insulin" on Completely Depancreatized Dogs.

N. F. FISHER (*American Journal of Physiology*, March, 1924) has determined the effect of "Insulin" on the indefinite maintenance of life in completely depancreatized dogs. He finds that some dogs can be kept alive and in fairly good nutrition for at least eight months on "Insulin." The normal body weight cannot be maintained and even when the "Insulin" doses are so regulated that little or no sugar appears in the urine, the polyphagia and some polyuria are present. Some totally pancreatectomized dogs on "Insulin" lose weight and die despite the "Insulin" control of hyperglycemia and glycosuria. The determining factor in the temporary or indefinite survival appears to be the capacity of the duodenal stump of the pancreatic duct to regenerate pancreatic tissue, as such regeneration appeared in the two dogs which survived for eight months, but not in the other dogs. "Insulin" probably does

not represent the entire pancreas hormone complex, since in the total absence of the pancreas "Insulin" cannot maintain life or does not control all the diabetic symptoms. The degeneration of the liver and the extreme arterial sclerosis developed in dogs on long "Insulin" treatment indicate either diabetic processes not controlled by "Insulin," chronic toxic action of "Insulin" itself or such toxic action of the other substances in the "Insulin" mixture.

BIOLOGICAL CHEMISTRY.

The Action of Rennet and Heat on Milk.

THERE has been much difference of opinion as to the effect of rennet and of heat on the caseinogen of milk and N. C. WRIGHT (*Biochemical Journal*, 1924, XVIII., No. 1) has investigated the subject, using as a criterion of alteration or otherwise of the caseinogen the curve of racemization, namely the rate of racemization of the protein in strong alkali as judged by the progressive diminution in optical rotation during incubation at 37° C. Such a method is sufficiently sensitive to differentiate proteins as similar as serum albumin and lactalbumin, where other methods, biological and chemical, have failed to do so. It would appear from the results obtained that the two proteins caseinogen and casein, must be considered chemically identical. The objection that the solubility of caseinogen is altered after treatment with rennet may be met by assuming that the rennet causes a change in the colloid condition of the caseinogen which facilitates precipitation in the presence of bivalent metal ions. It has been urged in favour of the "cleavage" theory, that is that casein has only half the molecular weight of caseinogen, that the function of rennet is to cause the preliminary splitting of the large caseinogen molecule prior to more complete digestion by the ordinary proteolytic enzymes. Such a view may be met by the equally probable explanation that rennet coagulates the caseinogen of milk in order to allow the protein to be retained for a longer time in the sphere of action of the digestive juices. Within the limits of the temperature studied (up to 120° C. for half an hour) heat does not affect the constitution of the caseinogen molecule. Any difference in digestibility must be due to alteration in the physical (colloidal) condition of the protein. The coloration of autoclaved milk is due to caramelization of the lactose, a reaction which appears to be catalysed by the presence of a colloid substrate of calcium caseinogenate.

Anti-rachitic Properties of Cow's Milk.

THERE has been much difference of opinion as to whether cow's milk possesses any specific anti-rachitic properties and, if so, to what extent

these may vary in degree according to the diet of the cow and the season of the year. M. A. Boas and H. Chick (*Biochemical Journal*, 1924, XVIII., No. 2) have investigated this question by observing the deposition of calcium in rats receiving a daily ration of milk from a cow kept under different conditions. The diet of the rats was, apart from the milk, deficient in fat soluble vitamins, but adequate in other respects, including vitamins B. and C. When the cow was kept in a dark stall and received either dry fodder or fresh green food, the milk was found to be defective in calcium-depositing properties, while under the influence of pasture feeding, a combination of green food, sunshine and fresh air, she yielded a milk which given in a small daily ration induced normal calcium retention and calcification of bones. They are inclined to attribute the difference to the effect of sunlight upon the cow. In the rats fed on milk from the cow during the time it was kept in a dark stall the retention of phosphorus was also affected, but to a less degree than the calcium. In these animals the ratio of calcium retained to phosphorus retained was found to decrease steadily during the early weeks of life, whereas in normal animals the ratio shows a steady increase. The influence of cod liver oil upon calcium deposition is not to be attributed to specific properties peculiar to that substance, but to its high content of fat soluble vitamins, as a similar effect upon calcium deposition can be demonstrated in the case of cow's milk, the degree depending upon the diet of the cow and the amount of sunlight to which she is exposed.

Iron and Fat in Anæmia.

J. M. D. SCOTT (*Biochemical Journal*, 1924, XVIII., No. 2) has studied the effect of the administration of inorganic iron salts and the effect of dietary deficiencies in the recovery from anæmia. The anæmia was developed in rats by feeding with a diet comparatively poor in iron. On this diet natural cure occurs slowly as the animals get older. Since this is so and since the sole addition of iron to the diet results in a hastening of the natural process of cure, it may be concluded that the anæmia is due to deficiency of iron in the diet. It is therefore another deficiency disease. In the case of rats fed on bread and milk with or without the addition of iron the milk fat or something associated with it is necessary for blood regeneration, but the evidence is insufficient to allow a decision whether its absence or the diminished supply of vitamin A. leads to a state of chronic under-nutrition, whether its function lies in facilitating absorption of iron or whether it is necessary for the functioning of the hæmopoietic tissues directly for the construction of the hæmoglobin molecule. Vitamin-free fat—palm kernel oil—does not supply the deficiency. The administration of inorganic iron, though efficacious if the diet is other-

wise sufficient, is in no way superior to feeding natural foods containing iron and the latter have the great advantage of also containing vitamin A.

Estimation of Urea by Urease.

G. M. WISHART (*Biochemical Journal*, April, 1923) has found that it is possible to carry out the hydrolysis of urea and the evacuation of the formed ammonia simultaneously. Curiously enough it is possible, provided Soja bean is used in the crude powdered state, to add to the solution containing urea the requisite quantity of sodium carbonate to liberate the formed ammonia without interfering with the hydrolysis of urea. The alkali would appear to be taken up by some constituent of the bean, possibly the proteins, and thus prevented from exercising its inhibitory action upon the enzyme. It has been noticed that the more rapid the aeration, the more quickly would the estimation be completed. The author has designed a special form of apparatus to provide for as rapid an air current as possible and at the same time to prevent loss of ammonia and the frothing of the solution. Details are given of two sizes of this apparatus, the larger size for use with solutions containing about 1% urea, the small size for solutions containing about 10 milligrammes per 100 cubic centimetre of fluid. The author points out that occasional controls are necessary to insure that no change has been undergone by the solutions in use especially in estimating low concentrations of urea.

Antiscorbutic Properties of Lemon Juice.

S. S. ZILVA (*Biochemical Journal*, May, 1923) deals with the conservation of potency of concentrated antiscorbutic preparations and in a second paper with the importance of reaction upon the destruction by oxidation of antiscorbutic potency. The author has had occasion to prepare concentrated decitrated lemon juice solutions found to be successful in the treatment of acute infantile scurvy. These solutions have kept for three months without any loss in potency. They have been made by treating 2.5 litres of lemon juice with carbonate of lime and three volumes of absolute alcohol. The filtrate is concentrated to one-tenth its bulk and acidified. It has been preserved under a bell jar over alkaline pyrogallic acid. The potency was tested upon guinea pigs. About 1.5 cubic centimetres was necessary daily to protect a guinea pig against the onset of scurvy. The author finds that decitrated lemon juice loses 80% of its antiscorbutic potency in thirty minutes when exposed to air provided its alkalinity is raised to pH = 12.5. When decitrated lemon juice is kept in the presence of air its acidity increases. When air is bubbled through decitrated lemon juice, its antiscorbutic potency is increased if the pH is raised to 2.2.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE WESTERN AUSTRALIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the Perth Hospital on April 16, 1924, Dr. D. P. CLEMENT, the PRESIDENT, in the chair.

Keratosis Pharyngis.

DR. H. BALDWIN GILL showed a female patient, aged twenty-one years, who was suffering from *keratosis pharyngis*. There was a typical distribution of sickle-shaped horny excrescences over the faucial and lingual tonsils.

Surgical Curiosity.

DR. F. GILL showed a small fig tree which had grown from a seed removed from a human appendix.

Hydatid of the Brain.

DR. R. H. CRISP showed a specimen of hydatid of the brain which he had removed *post mortem* from the brain of a boy, aged eleven years.

Puerperal Sepsis.

DR. F. S. TAYLOR-THOMAS read a paper entitled "Puerperal Septicæmia: Some Observations on its Ætiology, Treatment and Prophylaxis" (see page 5).

DR. D. P. CLEMENT, the PRESIDENT, thanked Dr. Thomas for his valuable paper. The following took part in the discussion:

DR. J. K. COUCH, DR. J. J. HOLLAND, DR. F. GILL, DR. M. K. MOSS, DR. D. MACKENZIE, D.S.O., DR. W. H. NELSON, DR. C. E. CRAIG, DR. F. STEWART.

DR. TAYLOR-THOMAS replied.

MEDICO-POLITICAL.

National Insurance.

SIR GEORGE SYME, the Chairman of the Federal Committee of the British Medical Association in Australia, gave evidence before the Royal Committee on National Insurance on June 12, 1924. His evidence is given in full below.

By the CHAIRMAN: What are the objects of the Federal Committee?—The Committee is constituted by the appointment of two members chosen by the Branches in each of the States and it acts for the whole of the British Medical Association in Australia in matters which concern the profession. The Branches deal with local State matters and anything which they think requires to be dealt with in regard to the whole profession, they refer to the Federal Committee. Generally, the Federal Committee discusses the matters which are brought before it by the Branches and, having arrived at an opinion, it refers its resolutions back to the Branches which adopt or modify them. The resolutions are generally adopted and they then become the resolutions of the Branches and are operative in the States.

So that as a matter of fact, the decisions of the Federal Committee have a binding effect upon the Branches?—Yes, but not necessarily so. The Branches have power to review the decisions of the Federal Committee and the decisions are not binding upon the members of the Branches unless the Branches adopt them. The Branches may refer them back to the Federal Committee for further consideration or modification. The Committee is also the medium of communication with the parent Association in Great Britain.

Has your Committee made any investigations in relation to this very big question of national insurance?—Yes, it has considered and is still considering it, but no conclusion has been reached.

Does the Committee propose to place a scheme before us?—I cannot say. It has been decided to send each of

the Branches a questionnaire and the replies will be referred to the Federal Committee for consideration.

Is that questionnaire in operation at present?—It has gone out to most of the Branches.

But the replies are not yet to hand?—No. The Federal Committee meets on July 16, 1924, when all these things will probably be considered.

As far as you know is it the intention of the Federal Committee to submit any scheme to us or does it propose to go direct to the Government?—I am afraid that I cannot answer the question. The Committee has not formed its opinion. It will be guided very much by what the Commission decides.

You will readily understand that in relation to the health branch of national insurance it would be utterly futile for any commission to work without the aid of the British Medical Association?—I am sure that the British Medical Association would be prepared to do anything to help.

Do you think that it would be possible for the matter to be discussed at your meeting in July in order to furnish us with some constructive idea of the British Medical Association's attitude towards national insurance.—I think so.

Have you, personally, given any consideration to this matter?—Yes.

In your opinion what would be effective medical treatment for a member of a national insurance scheme?—It depends upon the scheme.

I take it that it would be proposed to divide the members into panels for which there would be panel surgeons or panel doctors. If a patient visited the panel doctor and his case was diagnosed as acute periostitis, what would be effective treatment for him?—He would require to go into some institution for further observation and operative treatment.

The observation would have to be fairly quick in the case of acute periostitis?—Yes.

Then what would be adequate medical treatment?—The patient would have to go into some institution and be operated upon.

But I want to get a link between the institution and the panel doctor?—The probability is that the panel doctor would not be capable of carrying out the treatment.

He might be capable, but might not be in a position to do it. What do you think should be the link between the panel doctor and the institution?—I think that the panel doctor would have to refer the patient to some surgeon.

But would you suggest that the institution should be part of any scheme?—Yes. I think that you would require intermediate hospitals as part of the scheme.

What do you mean by intermediate hospitals?—Hospitals which are intermediate between public and private hospitals.

But under any national insurance scheme the patient would not pay for hospital treatment; it would be part of the scheme?—That was why I said "some institution". The difficulty would be in staffing such an institution.

But can you give us any suggestion as to the link?—I can only suggest that the patients would have to be attended by surgeons in the institution and they must have the right of selecting their surgeon or practitioner.

Would you suggest that the surgeons in the institution connected with national health insurance should be paid members of the institution?—No, I do not think that the profession would approve of that.

Then how would you make the link?—I do not know. It would be necessary for the scheme to give adequate medical treatment to all members of the community, irrespective of their position. Otherwise, it might break down?—That is the difficulty with the national insurance schemes which are in operation.

We want to take a lesson from the disadvantages and difficulties of other schemes, and we desire the assistance of the British Medical Association?—As far as I know the

view of the profession that is one of the reasons why it does not altogether approve of national insurance.

We would prefer to have from the profession a constructive criticism, rather than a destructive one?—But the trouble is that we do not see how we can get over the difficulty.

Do you mean to say that it is an insuperable one?—I do not say that, but we do not quite see how we can solve it with satisfaction to the patients and the profession. We believe in freedom of arrangement between patients and medical men.

That, of course, is in the first instance?—It is all through. The only solution that I, personally, can see is that under national insurance you should find the money and the institution to allow the patients to proceed pretty much as they do at present. The panel practitioner, if capable, would send the patient who required an operation, into the institution controlled by the national insurance commission and the patient would be operated upon either by himself or by a surgeon. Then the surgeon would charge what we call an intermediate fee which would be provided out of the funds of the commission.

You suggest that there should be institutions for hospital treatment and then the British Medical Association would take over the staffing of them?—They would not be staffed. I say that the position would be the same as at present. The patient would be attended by the surgeon or physician of his own selection.

But all the surgeons in Melbourne cannot operate at the Melbourne Hospital, for instance. Certain surgeons are selected?—They are not paid and nobody pays, except the contributors to the hospital. The staff are teachers as well as merely attendants upon the patients and they have to be selected for that purpose.

But we have still to overcome the difficulty of staffing the intermediate institutions?—I do not see how you could get over the difficulty. If you had a paid staff, the leading physicians and surgeons would not accept positions, as it would not be worth their while. You would thus create an inferior grade of men.

Do I take it that some body or other would set up a scale of fees?—Yes. We have an intermediate scale of fees.

Do you think that it would induce the best surgeons to operate, if called upon?—They would probably be attached to other hospitals and would have their private patients as well. If you had a paid staff, the position would be different.

I am referring to your statement that a patient should have the right of selection. Naturally, he would select the best man?—He selects the man he thinks is the best. Of course, the members have the right of refusal. They can refuse to accept an intermediate fee. You cannot overcome that difficulty. I may say that most surgeons and physicians will attend patients in the intermediate hospitals at a reduced fee, but they are not bound to do so.

Are there any intermediate hospitals in operation at present?—Yes.

I mean hospitals between public and private hospitals?—Yes. There are three: Bethesda, Epworth and St. George's. Nearly all the private hospitals will take patients at intermediate rates.

Are these religious institutions?—Bethesda is conducted by the Salvation Army, Epworth by the Methodist Church and St. George's by the Church of England.

By MR. MAHONY: I suppose they do not make religious distinctions?—No.

By THE CHAIRMAN: On the other hand, the churches may be in a position to induce members of the profession to accept positions?—I do not think that the members of the profession are influenced in that way.

We want to know from you how best we can attack this matter, so as to arrive at a satisfactory scheme for the general public of Australia. We appreciate that it would be impossible to carry on merely with panel doctors. There would have to be laboratories, hospitals, institutions *et cetera*; and we must have the assistance of the profession?—Of course, it is a very difficult problem.

Can we take it that the Federal Committee will look into the question and furnish us with some constructive criticism?—Certainly.

Now, have you given any consideration to the question of preventive treatment?—Yes, the Federal Committee has gone into the matter and a report has been adopted. It was prepared by a sub-committee of the Federal Committee, in regard to the relationship of the general practitioner to preventive medicine and in regard to possible improvements in the public health system, and means of bringing the general practitioner into more active cooperation with administrative authorities in preventive measures.

Will you give us a brief synopsis of the contents of that document?—It suggests an administrative scheme somewhat on the model of the United States health service, under which both States and Commonwealth would play a part. It gives a clearer definition of the respective duties of the States and Commonwealth in public health and lifts the general practitioner into active participation in the administrative scheme. There is suggested the steady inculcation of the ideal of prevention, rather than merely carrying out regulations, into both the actively administrative and the actively practising members of the profession. It suggests that for the scheme to be effective the registration of medical practitioners should be taken over by the Commonwealth, instead of being carried out by the States as at present. The unit in any such scheme would be the general medical practitioner, whether in general or special practice.

Might I suggest that the unit of the scheme is the member of the public?—I am only telling you what the report says. In addition to the treatment of patients, it would be the duty of the practitioner to notify the district health officer of all births, still births, miscarriages, deaths, cases of communicable disease and cases of mineral or organic poisoning. He would order the prescribed methods of concurrent and terminal disinfection in infectious cases. Those methods would be prescribed by the State health authorities. There would be carried out the prescribed methods for the prevention of the spread of infection by contact or carriers and the examination of school children in particular districts, by arrangement with the education authorities and the district health officer. The report suggests carrying out other health duties which shall be prescribed from time to time by regulation, or requested by the district health officer. Then, the administrative unit is the municipal district or shire council. Different terms are used for that body in different States. Under the district body would be a whole-time health officer and above the district units would be a State organization with a district health officer. These officers exist in cities, but in the country the various districts ought to unite to provide such officers. There would be a chief State medical officer of health, who is in existence and who would have much the same function as at present. There would also be a State health council, composed of the State chief health officer, the Commonwealth chief health officer, the State chief sanitary engineer, the State chief veterinary officer, a representative of the local administrative bodies, a representative of the practising medical profession and a representative of school or mental hygiene. That Council would meet regularly and would also arrange conferences of the various district health officers at least every six months. There would also be held at least once a year an interstate conference of State and Commonwealth officers of health. Finally, there would be a Commonwealth organization, with the Director-General as at present at the head. His functions would be the same and under him would be officers pretty much the same as at present: a quarantine officer, a medical officer in charge of laboratories and the chief Commonwealth health officer for the State. Then there would be as at present at the headquarters of the chief Commonwealth officer, a director of marine hygiene, a director of laboratories, a director of tropical hygiene, a director of epidemiology, a director of industrial hygiene, a director of sanitary engineering, a director of individual hygiene, a director of school hygiene and a director of animal hygiene. Those different officers would be available for advice to the territorial officers or the district officers.

BY SENATOR BENNY: They would be paid servants of the State?—Of the Commonwealth.

Permanent officers?—Yes.

BY THE CHAIRMAN: That scheme is a fore-shadowing of the extension of lectures on medical jurisprudence at the university and a continuation of the public health system; but let us come down to actual preventive measures?—The scheme would be carried out by the general practitioner being brought into cooperation.

What remuneration would you propose to give him?—The report says: "For all such services rendered the practitioner will receive fees prescribed by regulation. Part-time medical officers would be abolished, and all men in practice would be on the same level in relation to departmental administration and paid by fee."

The great advantage of a scheme of national insurance would be to increase the life of the unit of the scheme who would be the member. It seems that the only satisfactory way to deal with the question of preventive medicine is to have a close connexion between the member of the scheme and his medical officer. Our investigations show that prevention has been brought about to a certain limited extent by the examination of school children. It might be possible to educate the children so that in future years they would go to a medical attendant for periodical examinations. Can you give us any suggestions as to preventive medicine in relation to the unit of the scheme?—It depends upon the arrangements of the scheme.

I know that it is difficult to get people to be examined and the only hope that we have found so far seems to be to educate the children?—The Federal Committee is strongly in favour of more inspections of school children. The matter of bringing in the general practitioner to assist in the examination of school children in mentioned in the report.

Would it not be possible that in any scheme of national insurance arrangements might be made for periodical examinations. For instance, we have had evidence of persons being induced to be examined on their birthday, which had the effect of prolonging the average life by twelve years. That would have a very material effect upon any actuarial investigations or valuations of the scheme?—It would be a very admirable thing to have carried out.

Will you also consider that point at your next committee meeting?—That is part of the administration, if the scheme is carried out.

But it is not a simple matter to frame the regulations and conditions for such a state of things?—No, it is not. As I say, it is more a matter of administration.

It is more than that; it is the national aspect of the scheme?—But it is a matter of administration as to how it is to be carried out.

We desire to arrive at a satisfactory method of administration. However, we shall leave that point with you, if you will look into it. Have you given any consideration to the operations of the maternity allowance scheme?—Yes, the Federal Committee has considered that also.

Will you tell us your views in regard to it?—The committee sent a report to the Prime Minister some time ago to the effect that the money would be much better expended in providing maternity hospitals and ante-natal and post-natal care.

And there has been no further consideration given to the matter?—No.

Have you any other matter to place before us which has not been elicited by means of questions?—No. I think you understand that the Victorian Branch and, as far as I know, all the Branches have expressed the opinion that they are not in favour of any existing scheme of national insurance.

If the Federal Government had been in favour of any existing scheme, there would have been no necessity for a Royal Commission. We are really looking for an ideal scheme and we want everyone's assistance.

BY SENATOR BENNY: What are your personal views in regard to national insurance?—The question is very big and it depends so much upon the details as to whether it will ever be satisfactory. Personally, I would very much prefer that the Government should provide the funds and a certain amount of machinery, without introducing a compulsory scheme of national insurance. These things which are compulsory and under which people are bound by regulations, are very difficult to administer satisfactorily. The more you leave the matter to free arrangement between the patient and the medical attendant, the better. The relations of a patient and his practitioner are very peculiar, confidential and intimate and if you have a scheme of compulsory Government control of those relations, you are apt to find that they become unsatisfactory.

BY THE CHAIRMAN: The *Public Health Act* of today means control and compulsion?—Yes and is it satisfactory?

But you ought to extend it?—We want to extend by bringing in the general practitioner and paying him fees.

That still keeps the matter within the ambit of compulsion?—Yes. You cannot carry on without it, but the less there is of it the better. However, I can assure you that the Federal Committee will do everything possible in this matter, but it is a very intricate question and so much depends upon the details and regulations which are introduced. It is really the regulations and what you may call the red tape of the national insurance schemes in Great Britain, Germany and other places, which is damaging and interfering with their usefulness.

In the event of any national insurance scheme being introduced, would you be in favour of a pharmacopoeia and formulary, such as exists in the Melbourne Hospital?—Yes, provided that a certain amount of freedom was allowed to the practitioner.

The same amount of freedom would be allowed to a practitioner as is allowed in the Melbourne Hospital?—It would be economical.

That would be the only method of getting anything approaching a definite rate?—Yes. I see no objection to it, so long as the profession is not absolutely limited. That would be impossible, of course.

THE SYME FOUNDATION AND PORTRAIT FUND.

We have been requested by the Council of the Victorian Branch of the British Medical Association to announce that the Council has determined to establish a foundation which shall be in the name of Sir George A. Syme and which shall be applied to the advancement of surgical science. The Foundation Fund shall be controlled by the Council of the Victorian Branch of the British Medical Association. In the next place the Council has commissioned Mr. John Longstaff to paint a portrait of Sir George Syme to be hung in the Medical Society Hall. Lastly it has resolved to provide a replica of the portrait for presentation to Lady Syme.

The establishment of the Fund and the presentation of the portrait and the replica are the means adopted on the occasion of the retirement from active practice of Sir George Syme at the end of June of this year to mark a special and permanent expression of appreciation of the long and valued services which Sir George Syme has given to the medical profession of Victoria and Australia. Sir George had signified his intention of restricting his work after retirement chiefly to the duties of the honorary official positions which he holds in connexion with medical education and with the organization and service of the medical profession.

In order that all members of the medical profession may contribute to the Fund, it has been decided that the ordinary subscription shall be two guineas, but that contributions of any other sum will be received. All subscriptions and contributions should be forwarded to the Honorary Treasurer, Dr. C. H. Mollison, 41, Spring Street, Melbourne, not later than July 31, 1924.

Public Health.

NATIONAL INSURANCE.

DR. J. H. CUMPTON, Director-General of Health for the Commonwealth, gave evidence before the Royal Commission on National Insurance on June 16, 1924. He stated that any system of national insurance must include practical efforts toward the prevention of disease. Financial limitations required that preventable illness did not occur. The practice of medicine involved so close an interweaving of the prevention and cure of disease that dissociation of these two functions of medical science was not practicable. He urged on the Commission the view that there should be a close relationship between the public health service and the insurance system and that the provision for the removal of ill-health and for its prevention should be regarded as identical in purpose, alike in nature and largely capable of common treatment. The term public health was the collective expression of the private health of each individual citizen. It did not mean pure water, good drains, pure food or ventilated factories. The health of the individual was partly dependent on the health of his parents and the health of every person owed much to the state of his health at an earlier period of life. It would be unscientific and unpractical to ignore the known effects of illness in infancy on the health of the individual in later life. There were two aspects to be considered: the relationship between environment and health and the personal factors in individuals. He illustrated his meaning by displaying a series of models. These showed the death rates at the several age periods and the contributing diseases mainly responsible for death in each group. In dealing with deaths in infancy he pointed out that while there had been no reduction in the mortality of infants under one month, there had been some reduction in that of infants during the second and third months, a greater reduction during the second quarter of the first year and a considerable reduction in the second half of the first year of life. He interpreted this to mean that the congenital causes of death were just as potent as they were twenty-five years previously. There had been a reduction in the deaths from dietetic and intestinal disorders, the result of improved sanitation and of the more specialized attention to the individual child by private doctors and public agencies, such as baby clinics. In the next place, he dealt with enteric fever and showed that while much had been done to lessen the ravages of this disease, it still had a death rate of forty-two per million of population. Diphtheria mortality had been reduced, but the incidence of the disease had increased. From these and other data he drew the following conclusions: (i.) The environment should be made clean and kept clean; no impurity in air, earth, food or water which might affect the health of the individual adversely, should be permitted. (ii.) The prevention of disease required attention to individuals as much as attention to environment. (iii.) The general medical practitioner was as important a public health agent as the public health official. (iv.) There remained very important causes of invalidity and death to be attacked.

Dr. Cumpston then exhibited models illustrating the significance of tuberculosis, cancer and child-birth in connexion with the health of the community. There was much that could be done and should be done to discover the causes of these diseases and to prevent their occurrence. Any reduction in the mortality of these diseases would have a direct financial benefit for any insurance scheme and the direct benefit to the national health would be enormous. Concerted and well-directed research was necessary to secure reliable information as to the reasons of these causes of death in Australia.

He stated that there were four essentials to success in the campaign against the occurrence of disease: (i.) Sanitary control of the environment, (ii.) successful application of medical knowledge to prevent the occurrence of disease in every individual, (iii.) effective cooperation between official health agencies and the general practitioner and (iv.) investigation and research for the re-

moval of existing obstacles to success. He proposed to examine the present position with the object of indicating the relationship between it and a national insurance system in respect to each of these four essentials.

Sanitary Control.

It was not easy to separate sanitary control from measures to prevent disease in the individual. For example, the measures adopted in Broken Hill to prevent the occurrence of degenerative changes in the lungs of the miners relied partly on mechanical measures in the environment. The national supervision of "public health" was becoming increasingly concerned with the national supervision of the health of the individual. Public health legislation varied in the different States. The following were the functions with which the acts dealt: Control of water supplies, of sewers and drains and the disposal of sewage, of night soil removal and disposal, of scavenging, removal of refuse, cleansing of streets, of dwellings, boarding houses and lodging houses, of public buildings, of nuisances and offensive trades, of foods and disinfectants, of infective diseases, of venereal diseases, of vaccination, of private and public hospitals, of morgues, cemeteries and crematoria and of the registration of nurses and midwives. In no one State did the *Health Act* include all these functions. Dr. Cumpston indicated the manner in which these measures differed from one another. In New South Wales the Health Department had powers to act in the case of default by a local authority in respect of the following: Keeping premises free from offensive and unwholesome matter and the suppression of nuisances, regulating the storage, sale, conveyance, disposal and delivery of meat, fish, oysters and crustaceæ, regulating cattle intended for slaughter, abattoirs and slaughter houses, controlling sewerage and drainage, controlling the removal of nightsoil, filth, refuse and garbage and the destruction of garbage, controlling the construction and situation of privies, public urinals, closets and lavatories, regulating the sanitary requirements of public baths, dressing sheds and dressing rooms, regulating and controlling common lodging houses and seamen's boarding houses, establishing, controlling, maintaining and regulating infants' milk depôts and regulating the interment of the dead. Many of these provisions, such as the infant welfare work, were not included in the *Health Act* at all. Recently the Arbitration Court in New South Wales had incorporated in a finding regulations controlling the printing trade to conserve the health of the employees. Dr. Cumpston expressed the view that the logical and inevitable development in respect of the sanitary control of man's environment was the transfer to the local authority. The administration should be devoted to strengthening by education, exhortation, demonstration or compulsion the sense of responsibility in the local authority. An insurance system should not be directly involved in the routine administration within this field of activity. But since defective administration by a local authority might adversely affect the finances of a national insurance administration, the Commonwealth would have an indirect interest of an important kind. The general supervisory control by the State authority should not be weakened or removed. Indeed, it required strengthening. In Victoria the grouping of local authorities into districts, each of which employed a full-time medical officer of health, had been introduced and this plan should be adopted throughout the Commonwealth. At times the interest of adjoining districts might be in conflict, such as in connexion with the water supply from an extensive catchment area. In these circumstances the services of a specially trained sanitary engineer should be available. The Commonwealth Department of Health had established a division of sanitary engineering with trained officers, competent to advise on the more difficult aspects of sanitary engineering. A Commonwealth insurance administration could also assist in this phase by subsidizing district health administrations and by applying the provisions of Section 53 of the *National Insurance Act* of England and Wales for the purpose of establishing a normal sickness and death rate for each district and of having some power by arrangements with the State Governments or other suitable means of inquiring into the conditions responsible for any excess over the normal

rates. No one who had knowledge of the conditions disclosed in certain country towns when the incidence of plague directed attention thereto and no one who had read the reports of the Hookworm Campaign, could fail to realize the necessity for closer contact than existed between the local authority and the State Health Department.

Health of the Individual.

Dr. Cumpston cited vaccination against variola, enteric fever and cholera, toxin-antitoxin immunization against diphtheria, the search for carriers in cerebro-spinal meningitis and in cholera, the delousing of persons against typhus fever, the administration of quinine against malaria and the administration of chenopodium oil against hookworm to support the contention that measures aimed at the large-scale control of epidemic diseases consisted entirely of measures imposed on the individual. The medical supervision of large numbers of individuals had become recognized as an integral part of the campaign to prevent disease. The infant was provided for at the baby clinic, the school child by the school medical service, the expectant mother at the ante-natal clinic and by the registration of midwives. With the exception of vaccination, the control of infective diseases and the registration of midwives, the several *Health Acts* dealt exclusively with the environment of man and the food he consumed, but did not deal with the man himself. Each of the *Health Acts* contained elaborate provisions prohibiting the letting of a house in which a case of infective disease had occurred within six weeks, unless disinfection had been performed, a measure of doubtful utility, but not one contained provisions prohibiting the discharge from hospital of a convalescent from enteric fever until he had been proved by bacteriological examination to be no longer infective. The spread of infection from man to man or from animal to man was recognized as infinitely more important than the condition of the environment.

Hereditary Influences.

Turning to the scope of the work in combating the hereditary influences and congenital defects, Dr. Cumpston pointed out that "congenital malformations and debility" stood fourth in the list of causes of death in order of magnitude. The principal factors operating were defective strain in the parents, disease in the parents and accidents during pregnancy or child-birth. Certain grosser varieties of disease rendered persons unfit to marry. The Constitution gave the Commonwealth power to legislate in respect of marriage and divorce. Both phases of the subject should be explored and utilized for the purpose of preventing the propagation of the unfit. This was not merely a question of syphilis. He advocated the education of the public by carefully compiled statements and publications. He also favoured the compulsory registration of all still-births.

Maternal Hygiene.

In submitting statistics dealing with the number of deaths of mothers in child-birth and the findings of the Commonwealth Departmental Committee on Causes of Death and Invalidity, Dr. Cumpston contended that the whole problem could be summarized in the phrase: "Skilled assistance to all mothers before, during and after labour." The actual number of deaths during child-birth in 1922 was 621; the number of instances in which women were left injured or invalidated to an extent sufficient to affect their health and their value as insurance risks was certainly much greater. The Federal Committee of the British Medical Association in Australia had declared as its opinion that the money devoted to the maternity bonus could be more effectively expended for the extension of maternity hospitals, ante-natal clinics and infant welfare centres, for the provision of more efficient midwifery training for nurses and medical students, for the provision of help to mothers and expectant mothers in necessitous circumstances and by the adoption of such other measures as might be advised from time to time by medical experience. Financial assistance might be offered to the University authorities for the purpose of improving the training of medical students in obstetrics. In regard to registration of nurses and

midwives, he stated that the considerations which suggested the necessity of one Commonwealth registration of medical practitioners, applied equally to midwifery nurses. More information was needed in connexion with the extent of medical assistance rendered in the home to lying-in women. It was undeniable that hospital facilities were inadequate. Dr. Cumpston outlined a scheme for the subsidizing of hospitals for this purpose. This scheme included assistance varying from a subsidy equivalent to 50% of the actual expenditure in maternity hospitals or maternity departments of general hospitals or equivalent to 60% when the hospital maintained an efficient antenatal clinic or equivalent to 75% when the hospital maintained both an ante-natal and a venereal diseases clinic. Subsidies were further suggested for convalescent or rest homes, for any scheme for providing domestic help in the home during the lying-in period and for the employment of bush nurses with registrable qualifications in midwifery. These contributions should be subject to evidence of efficient management of the institution and the provision of facilities for the training of nurses and students. The legislative measures in the various States would require amendment to include the registration of midwifery nurses, the control of private maternity hospitals and the notification and control of purulent ophthalmia and puerperal septicemia. Dr. Cumpston held that maternal welfare should be associated with the Health Department.

Infant Welfare.

In the first place Dr. Cumpston spoke of the voluntary agencies dealing with infant welfare. Important work of this kind, he stated, was not entrusted to the Health Departments. If the insurance system was to be linked with a general health system, a critical examination of the whole question of infant welfare in Australia would be in order and would be profitable.

School Hygiene.

Dr. Cumpston called attention to the fact that in only one State was there any association between the national responsibility for the care of the health of school children and the Health Departments. There was little unity of purpose, identity of methods or general harmony of direction. One State had a large staff of medical inspectors doing extensive work; others had entirely inadequate staffs, while one had no medical staff at all. He could see no valid reason why the general body of the medical profession could not be employed as medical inspectors of school children. As far as the Commission was concerned, the most important matter was that, while effort was spent in discovering defects, no steps at all adequate in their scope were taken to insure that these defects were removed.

Industrial Hygiene.

Dr. Cumpston dealt with industrial hygiene in its widest sense and maintained that kitchen neurasthenia was just as real an industrial disease as miners' phthisis or mercury poisoning. Industrial hygiene was only in its infancy, but even at this early stage it had been diverted into the wrong course. Whatever had been done by law in the several States had been done under the several *Factory Acts* and by the Departments of Labour and neither by nor in association with the Health Department (save in Western Australia). Good progress had been made, albeit with considerable diversity among the States, in regard to the hygiene of factories, workshops and mines. The Division of Industrial Hygiene of the Commonwealth Department of Health was engaged in the preparation of standard requirements with the object of encouraging uniformity as between the States. The hygiene of ships had been fully dealt with under the provisions of the *Navigation Act* by the Commonwealth Department of Health. The conditions of employment of women and children were more or less prescribed in the several States, but there was still much to be learned and considerable progress to be made. From the insurance aspect periodic medical examination of adolescents engaged in various industries should be regarded as very important.

The practice of supervising the health of workers had already become adopted as a legislative measure. No

system of insurance could ignore the practice of constant medical supervision of large bodies of employees. By controlling the hygienic conditions under which men and women worked, by watching the reaction of employees to their work, by dealing with the first signs of epidemic disease and by discovering and correcting the first signs of disease in the individual, the medical staff could add enormously to the happiness and health of the employees. In discussing the system to be adopted, Dr. Cumpston stated that the appointment of departmental officials for this work would probably be the least satisfactory way. Employers should be encouraged to inaugurate their own services either by differential insurance premiums or by paying the medical fees for all insured persons treated by the company's doctor. Certain details were discussed. The insurance administration could help toward the high grade efficiency by providing facilities for all medical practitioners employed in this work to be kept informed of all recent developments. Expert advice could be given in all problems when such advice would be useful. Whatever method was adopted, from an insurance point of view it would be impossible to over-estimate the importance of all industries having skilled medical advice available at all times for employer and worker. To entrust the direction of such a medical service to a chief inspector of factories was to invite disaster. Some form of correlation between the school medical officer and the industrial medical service was essential and could be arranged.

Personal Hygiene.

Dr. Cumpston enunciated the thesis that any insurance scheme would necessarily in its own interests consider carefully any means of preventing illness among its insured clients. He enumerated several points to illustrate the wide variation of opportunity for medical science with the aid of proper institutions to check early disease and to prevent suffering, disease and national expenditure. These included the following. The extent to which an efficient service of maternal hygiene was instituted, would determine the extent of the invalidity prevented. The extent to which a service of infant hygiene was instituted, would determine the extent of the after effects prevented. There was an opportunity for work to prevent heart disease in its early stages from becoming chronic and thus leading to incapacity. The same would obtain in regard to many other diseases. Convalescent or after-care services under medical direction would insure that the patient after discharge from hospital would either be offered suitable employment or put into a condition to resume his former occupation. A service could be instituted which would result in the early detection of disabling or fatal diseases at a stage when the signs were little noticeable to the patient. In many cases the conditions could be corrected at this early stage. The idea of periodic medical examination had been introduced by the Life Extension Institute of New York. Dr. Cumpston suggested that a medical and dental examination of every person every second year up to the fortieth year of life and every year thereafter would yield the greatest national profit. No system of national insurance could be considered as soundly based from an economical point of view unless it included provision for some approximation to this. This was not work to be undertaken by an army of medical officials. The whole medical profession was available, was competent and should be utilized. A most important corollary to any such scheme was some organization for either finding suitable employment for a person with early disease or some unemployment benefit while he was receiving treatment. If, Dr. Cumpston said, it was necessary to take stock annually of the nation's financial assets, it could not be considered irrational to take stock annually of the nation's human assets. He displayed a table showing the number of cases of disease treated in the several hospitals in Victoria during a single year.

The General Medical Practitioner and Preventive Medicine.

From the foregoing it would be seen that the general medical practitioner had an opportunity of playing a most important part in the prevention of disease and that

certain measures of prevention could only be carried out by him.

There were certain duties other than notification that the general medical practitioner could do and was in a better position to do than the official medical officer of health. Notification of births, still-births and miscarriages should be made to the district medical officer of health by the doctor in attendance. At the same time he could make comments without violating professional confidence, to place the medical officer of health in a better position to act for the good of the patient or of the public health. The actual cause of death could be certified confidentially. Industrial disease or disorders could be notified. School children could be examined and treated as part of the national system of school hygiene. Information could be provided concerning diseases in connexion with any general investigation being made by the central authority into the occurrence of disease. All these duties had been performed in the case of Commonwealth medical referees and area medical officers. In enlisting the cooperation of the general medical practitioner it was to be understood that he would not be expected to undertake any duties which were not on the lines of his daily work, that he should be adequately paid for all work done, that he should be prepared to accept both advice and direction from trained public health officials on matters outside the range of his own experience or within the range of official necessities and that he should be prepared to accept discipline in professional matters relating to public health from an official body of his professional colleagues in place of police court discipline at present provided by statute. Dr. Cumpston then read a portion of the report of the meeting of the Federal Committee of the British Medical Association in Australia held on July 29 and 30, 1919 (see THE MEDICAL JOURNAL OF AUSTRALIA, August 9, 1919, page 119). In this connexion Dr. Cumpston referred to the ethical aspect of the correction of diagnostic errors by consultants and the importance of strict accuracy of information given in medical certificates.

Dr. Cumpston thought that if general practitioners required to discharge an extensive range of duties, the Government should be prepared to provide certain facilities, including expert advice on questions of hygiene, prevention of infective diseases, infant and maternal hygiene and hygiene of school life, laboratories to supply reliable information as to bacteriological and chemical diagnosis and so on.

The Position of the Hospital in Relation to Preventive Medicine.

General hospitals could be associated with the public health administration in regard to venereal disease, to the provision of surgical or medical treatment of school children, to the notification of infective diseases and to the supplying of information or pathological material to assist in any general inquiry. There should be a closer relationship between the hospitals and the health administration in settled country districts in regard to the control of infective disease and the provision of wards and hospitals for their treatment. Some degree of uniformity and a universal high standard of efficiency should be attained in maternity hospitals and other institutions. This did not imply a need for centralized control. The insurance commission might have on its staff one or two doctors thoroughly trained in hospital administration who should visit all hospitals affiliated with the administration.

The object of notification of births within three days of the event would enable the health nurse to perform valuable work. The notification of deaths and still-births would provide the health officer with information essential to his duties.

Dr. Cumpston emphasized the extreme importance of a single Commonwealth registration of medical practitioners, particularly if a national scheme of insurance were inaugurated. He also advocated the institution of a special professional tribunal for disciplinary purposes. Similar Commonwealth registration of nurses and midwives should also be introduced.

Statistical Work.

It was pointed out that under an insurance scheme special provision should be made for the collection of statistical data in connexion with disease. The facilities at present supplied by the Statisticians' offices were insufficient for the purpose.

Research.

Any insurance scheme that might be adopted in Australia should provide for research, but this research should be directed for a long period to concerted attacks on one selected problem at a time. In addition, continuous research into the less obvious and less tangible problems by the application of purely scientific methods should be carried out. He reminded the Commissioners that the causes of morbilli, scarlet fever and cancer were still unknown. He expressed the view that health research should be organically associated with health administration and should not be a separate organization.

Dr. Cumpston dealt briefly with the subjects of tuberculosis, venereal diseases, mental hygiene, patent medicines, publicity, education and demonstration in this connexion.

The Commonwealth Department of Health.

In concluding his evidence he sketched the organization of the Commonwealth Department of Health and indicated how this organization would suffice for the development of the principles and ideals indicated in his remarks. The consensus of opinion was that no existing insurance system had resulted in any successful effort or noticeable results in relation to the prevention of disease. There was a very general tendency to confuse public health with the treatment of patients. A public health policy would embrace hospitals, mental hospitals and so on, without any necessary reference to the prevention of diseases which filled them. There was a great necessity for a gradual development under inspired direction of the curative phases of medical science to their ultimate utilization for preventing the development of disease. Compulsion was less likely to be successful than precept and individual initiative.

Medical Appointments.

DR. M. FRIZELL (B.M.A.) has been appointed Honorary Radiographer at the Coast Hospital, Little Bay, New South Wales.

THE undermentioned have been authorized by the Board of Health of New South Wales as Inspectors under Section 50 of the *Cattle Slaughtering and Diseased Animals and Meat Act, 1902*: DR. A. G. BRYDON (B.M.A.), at Armidale; DR. T. E. GEORGE (B.M.A.), at Warralala.

Births, Marriages and Deaths.

THE charge for inserting advertisements of Births, Marriages and Deaths is 5s., which sum should be forwarded in money orders or stamps with the notice, not later than the first post on Tuesday, in order to insure insertion in the current issue.

DEATH.

CARTER.—On June 3, 1924, at the Repatriation Hospital, Victoria, DR. GERALD B. CARTER, Major Royal Army Medical Corps (retired), late Major, Australian Army Medical Corps, Medical Officer, 12th Battalion, husband of Gwendoline Carter, of "The Albany," Hobart.

Medical Appointments Vacant, etc..

FOR announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xviii.

ANTI-TUBERCULOSIS DISPENSARY, SYDNEY: Honorary Assistant Physician.
UNIVERSITY OF MELBOURNE: Chair of Pathology.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District Friendly Societies' Dispensary. Balmalm United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham Dispensary. Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney. Marrickville United Friendly Societies' Dispensary. North Sydney United Friendly Societies. People's Prudential Benefit Society. Phoenix Mutual Provident Society.
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association. Proprietary, Limited. Mutual National Provident Club. National Provident Association.
QUEENSLAND: Honorary Secretary, B. M. A. Building, Adelaide Street, Brisbane.	Brisbane United Friendly Society. Institute. Stannary Hills Hospital.
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide.	Contract Practice Appointments at Renmark. Contract Practice Appointments in South Australia.
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Diary for the Month.

- JULY 8.—New South Wales Branch, B.M.A.: Ethics Committee.
- JULY 9.—Tasmanian Branch, B.M.A.: Branch.
- JULY 9.—Melbourne Paediatric Society.
- JULY 9.—Central Northern Medical Association, New South Wales.
- JULY 10.—New South Wales Branch, B.M.A.: Clinical Meeting.
- JULY 10.—Brisbane Hospital for Sick Children: Clinical Meeting.
- JULY 11.—Queensland Branch, B.M.A.: Council.
- JULY 11.—South Australian Branch, B.M.A.: Council.
- JULY 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- JULY 16.—Victorian Branch, B.M.A.: Council.
- JULY 16.—Western Australian Branch, B.M.A.: Branch.
- JULY 18.—Eastern Suburbs Medical Association, New South Wales.
- JULY 22.—New South Wales Branch, B.M.A.: Medical Politics Committee: Organization and Science Committee.
- JULY 24.—New South Wales Branch, B.M.A.: Branch.
- JULY 25.—Queensland Branch, B.M.A.: Council.
- JULY 31.—South Australian Branch, B.M.A.: Branch.
- AUG. 1.—Queensland Branch, B.M.A.: Branch.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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